

Forensic and Pharmaceutical Risks in the Organization of Pharmacotherapy of Covid, Post-Covid and Long-Covid Disorders. COVID-19 and Vaccination Practice Standards.

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Abstract. The COVID-19 pandemic has strained the healthcare system. It is important to consider forensic and pharmaceutical risks in the organization of vaccination practices and pharmacotherapy of covid, post-covid and long-covid disorders. Scientific sources on the clinical characteristics of SARS-CoV-2, COVID-19 have been systematized. The standards of vaccination practice (immunization, vaccination) of different age categories of the population in Ukraine, England, USA, Belgium, Greece, Japan, and Portugal were analyzed. Proven that the organization of pharmacotherapy schemes is difficult due to the presence of mixed infections, comorbid and complicated forms of diseases, the formation of virus resistance to drugs, and the development of secondary immunological insufficiency. The risks of pharmacotherapy with regard to mortality in patients with COVID-19 due to the development of severe lung lesions and systemic multiorgan pathology are indicated. Schemes of combined

pharmacotherapy including antiviral, anti-inflammatory drugs, glucocorticosteroids, genetically engineered biological drugs and "targeted" basic anti-inflammatory drugs were analyzed. The theoretical prerequisites for "repositioning" (drug repurposing) for the treatment of COVID-19 and ego complications are indicated. New directions of anti-inflammatory pharmacotherapy of COVID-19 Janus kinase with a range of anti-inflammatory and antiviral effects were noted. Emphasis was placed on the importance of informing health care professionals about forensic pharmaceutical risks in pharmacotherapy and vaccination practices. The relevance of legal support for medical activity in the conditions of a pandemic was noted. Further research is ongoing.

Keywords: forensic pharmacy, coronavirus, SARS, SARS-CoV-2, COVID-19, pharmacotherapy, post-covid, long-covid, vaccines, standards.

Introduction. Viral infections are responsible for many health disorders, from common diseases (influenza) to emerging infections (Zika virus, SARS-CoV-2, monkeypox virus) [1-5].

Understanding how the immune system works to prevent and clear viral infections is important for forensic pharmaceutical risks in the organization of pharmacotherapy and pharmaceutical support of vaccination practices (immunization, vaccination). Vaccination coverage is the best indicator of the level of population protection against infectious diseases [6-8].

According to WHO recommendations, for the safety of all age categories of the population, the level of vaccination coverage should be at least 95% [9-12].

Infectious diseases are not going away. A war in the country can only contribute to their spread. Any interruption of scheduled vaccination, even for a short period, will increase the probability of outbreaks of vaccine-controlled infections [13].

A new viral pathogen called severe acute respiratory syndrome coronavirus 2 (Severe Acute Respiratory Syndrome Coronavirus 2, SARS-CoV-2) is responsible for the disease known as COVID-19 [14]. A new coronavirus appeared in Wuhan (China) at the end of 2019. Coronaviruses are a large family of RNA-containing viruses that cause zoonotic infections that are transmitted between animals (civet cats, dromedary camels, etc.) and humans [15-19].

Currently, coronaviruses are divided into four subfamilies (alpha, beta, delta and gamma) and more than thirty species. The list is constantly updated. The reason for the appearance of new coronaviruses, which cause severe and rapidly spreading diseases, is spontaneous mutations. Therefore, all types of coronaviruses can potentially be dangerous for humans. From 10 to 30% of annual cases of acute respiratory viral infections can be caused by coronaviruses. Coronaviruses can cause diseases of varying degrees of severity in people: from common colds to more severe ones [20].

In the context of the COVID-19 pandemic, it is important to ensure all vaccination practices against dangerous diseases, especially for children. Due to the COVID-19 pandemic, some parents have faced interruptions in medical services and obstacles to making an appointment with a doctor for a healthy child. This has affected the schedules of standard immunization. Although medical services have since been largely restored, the appeals of doctors and parents testify to a persistent lack of vaccination practices for children [21].

How has COVID-19 affected vaccination practice standards? Sustainable vaccination systems for children, adolescents and adults must continue in the context of a changing health environment. High vaccination coverage cannot be sustained by one-off or short-term efforts. A better understanding of strategies to increase and maintain vaccination coverage is necessary to establish long-term effective standards of immunization practices [22].

Many public health strategies are working to increase vaccination coverage. Some are effective in increasing vaccination practices (such as school enrollment policies). Some strategies (eg, reducing costs, linking vaccination with services for women, infants and children, home visits) work well to increase coverage in certain populations. Taking into account forensic pharmaceutical risks in the organization of vaccination practice and pharmacotherapy of covid, post-covid and long-covid disorders plays a decisive role in pandemic conditions [23-29].

The purpose of the study was to generalize the standards of vaccination practices against the background of the pandemic. Study of forensic and pharmaceutical risks in the organization of pharmacotherapy of covid, post-covid and long-covid disorders. Systematization of data from various scientific sources on the clinical characteristics of COVID-19.

Materials and methods. A complex experimental study was carried out: forensic and pharmaceutical, organizational and legal, clinical and pharmacological. Forensic and pharmaceutical, organizational and legal, clinical and pharmacological approaches included the study of the forensic and pharmaceutical risks in the organization of

immunization practices and pharmacotherapy of covid, post-covid, long-covid disorders using traditional research methods. The study was conducted at the intersection of the organization of healthcare, organization and management of pharmacy, clinical pharmacy, management for different groups of patients and was based on the principles of evidence-based medicine, evidence-based pharmacy [30-41].

The study was conducted from March 2019 to August 2022.

The information base of the study consisted of scientific works of foreign and domestic scientists on the topic of the article (more than 700). The review of scientific sources of literature was carried out taking into account the recommendations of the Cochrane Society for PICO: P (population) – the population of patients with covid, post-covid and long-covid disorders; I (intervention) – recommendations for clinical and pharmacological examination of patients with covid, post-covid and long-covid disorders; C (comparison) – comparison in research technology, experimental study; O (outcomes) – research results. Based on a review of published qualitative strategy and management research, the author identifies highly innovative academic articles, that is, a study that demonstrates substantial novelty in every part of the research process. The author works through these articles in detail to demonstrate their novelty, highlighting concrete ways in which scholars have innovated three interconnected parts of the research process: data generation, data analysis, and presentation of findings.

Among the traditional research methods used are regulatory, documentary, normative and legal, retrospective, clinical and pharmacological, comparative, system, forensic and pharmaceutical and graphic.

Microsoft Excel (descriptive characteristics: minimum and maximum value, average value) was used to process the results and determine the consistency between the studied parameters.

The research of the article is a fragment of research work of the Kharkiv Medical Academy of Postgraduate Education on "Improving the organizational and legal procedure for providing patients with drugs from the standpoint of forensic pharmacy, organization and management of pharmacy" (state registration number 0116U003137, terms 2016-2020) and "Pharmaceutical and medical law: integrated approaches to the system of drug circulation from the standpoint of forensic pharmacy, organization and management of pharmacy" (state registration number 0121U000031, terms 2021-2026).

Results and discussion. To date, there are about forty types of coronaviruses known. Only seven of them cause disease among humans. The most severe for humans were (SARS, SARS-CoV and SARS-CoV-2), which caused large outbreaks of deadly pneumonia in the 21st century [45].

In 2012, the so-called Middle East Respiratory Syndrome (MERS) was first registered in Saudi Arabia [46].

COVID-19 is a type of coronavirus whose pathogenesis has been studied to a certain extent to date.

In the minds of the COVID-19 pandemic, ship-pharmaceutical risks are based on standards of practice for vaccinating various age categories of the population. The

National Vaccine Advisory Committee (NVAC) Standards of Practice for Immunization of Children and Adults and the Standards of Practice for Immunization of Adults are recommended for selection by all healthcare professionals in the public and private sectors [47, 48].

Standards of practice for child immunization and vaccination include five factors (Fig. 1) [22].

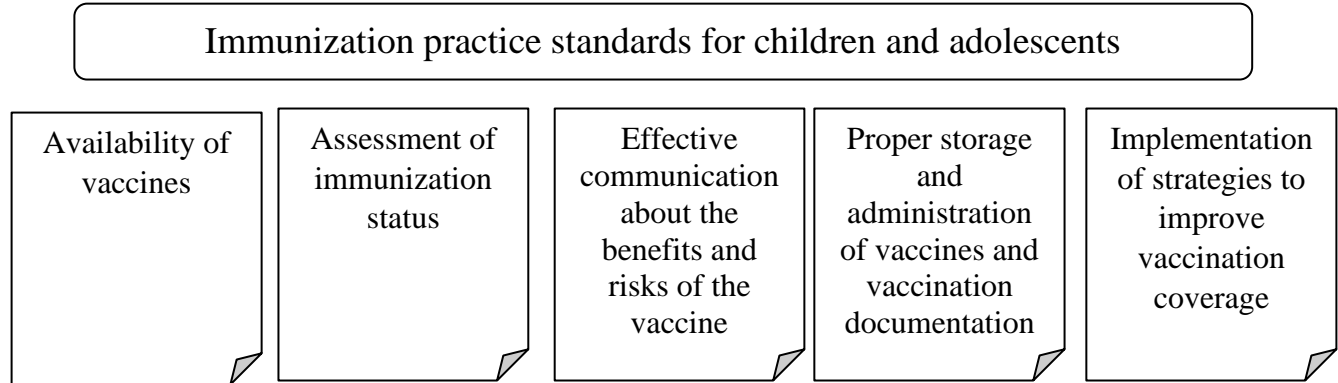


Fig. 1. Standards of vaccination practice for children and adolescents [22].

Standards of practice for immunization of adults include four factors (Fig. 2).

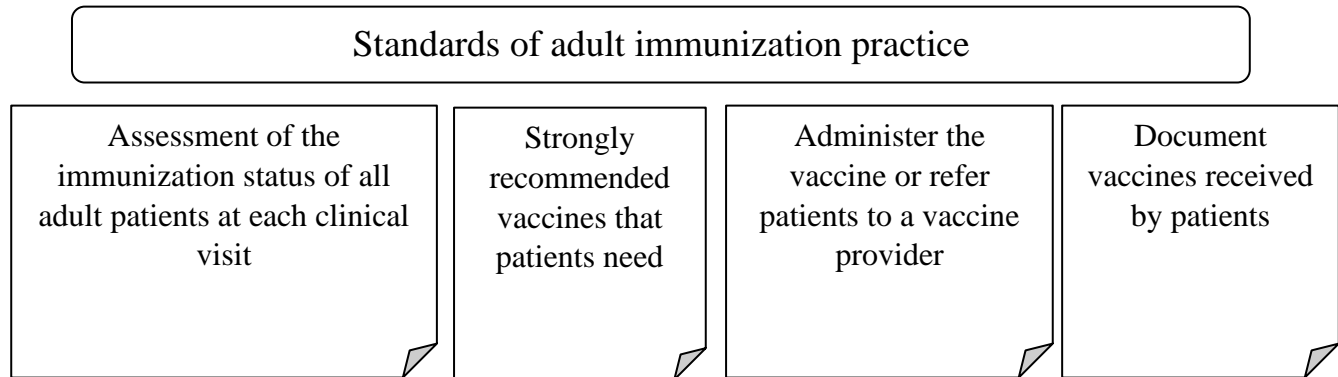


Fig. 2. Standards of adult vaccination practice [22].

Vaccines differ from other medicines in two important ways. First, they are intended for the prevention of diseases, and not for their pharmacotherapy. They do this by preparing the human immune system to recognize a specific disease-causing bacterium, virus, or other pathogen. This "memory" can last for years, and in some cases, for a lifetime. Second, vaccines are generally biological in nature, not chemical like most drugs. The production of vaccines is more difficult and expensive. Vaccines are less stable and more heat-labile than chemicals. Vaccines need to be refrigerated to keep them within a certain temperature range. Most vaccines must be refrigerated or frozen. Today, intranasal vaccines are being developed that can be stored at room temperature [23].

The COVID-19 pandemic and related disruptions have strained health care systems. In 2021, 25 million children were unvaccinated, 5.9 million more than in 2019 and the highest since 2009.

By 2021, about 81% of infants worldwide will have received three doses of the diphtheria, tetanus, and pertussis vaccine, protecting them against infectious diseases that can cause serious illness and disability or be fatal. This slowdown is likely to continue as countries focus on ongoing efforts to control the COVID-19 pandemic [24].

In Ukraine, the level of vaccination coverage of children for 6 months of 2022 was below 40%. According to calculations of such a trend, by the end of 2022 vaccination coverage will reach only 60%, which is not enough for the formation of collective immunity [4].

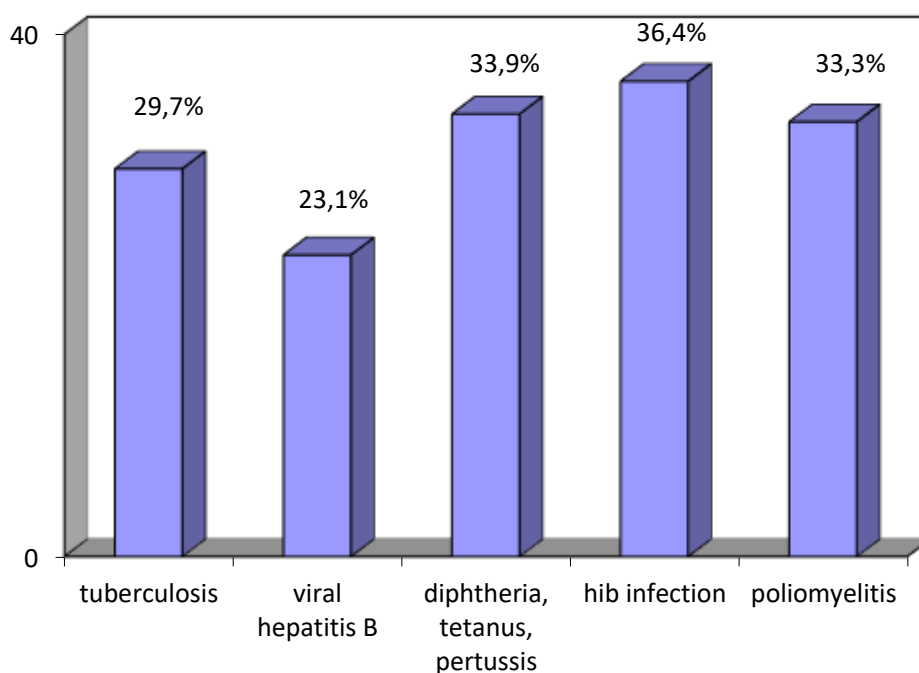


Fig. 3. The specific weight of vaccinations for 6 months of 2022 among children [48].

In Ukraine in 6 months of 2022, of all children under 1 year only (Fig. 3):

- 29.7% received their doses of vaccination against tuberculosis;
- 23.1% received their vaccination doses against viral hepatitis B;
- 33.9% received their vaccination doses against diphtheria, tetanus and pertussis;
- 36.4% received their doses of vaccination against Hib infection;
- 33.3% received their polio vaccination doses.

Data from Luhansk and Donetsk regions are missing due to active hostilities caused by Russia's full-scale war against Ukraine. Kherson, Kharkiv, and Zaporizhia regions provided partial information [48].

In England, diphtheria, tetanus, poliomyelitis, pertussis and Haemophilus influenzae B (Hib) vaccination practices were carried out separately between 1994 and 2006. Combined vaccination against all five diseases was introduced in 2006-2007. The availability of one combined vaccination may have simplified the vaccination schedule for children and parents [50].

In the US, similar improvements in pneumococcal (PCV) and Hib/meningococcal group C (MenC) vaccine coverage were observed between 2006-2007 and 2010-2011, indicating an overall increase in vaccination coverage regardless of the new method of administration. In 2017, the five-in-one vaccine was replaced by the hexavalent six-in-one vaccine, which provides additional protection against hepatitis B [51, 52].

Vaccination practices between 1994 and 1997 in England showed relatively stable measles, mumps and rubella vaccination coverage for two-year-olds at around 91%. In 1998, a discredited article appeared in *The Lancet* [53] linking vaccination to autism. *The Lancet* partially retracted the article in 2004 and fully retracted it in 2010. The vaccination rate increased to 92.7% in 2013-2014. From 2011-2012 to 2013-2014, the level of coverage of all childhood vaccinations was at a plateau, and subsequently decreased to 90.3% [54].

All routine childhood vaccinations in the UK assessed up to five years of age are expected to achieve 95% coverage according to WHO guidelines [55, 56].

In 2020-2021, child coverage for DTaP/IPV/Hib [57], PCV and MMR [50] boosters was over 90% for the UK.

Vaccination practices for 2020 and preliminary data for 2021 show a sharp decrease in the number of laboratory-confirmed measles cases, with only 79 confirmed cases of measles in 2020 and 2 cases in 2021. This likely reflects the impact of measures to control COVID-19 on the spread of other infections.

It poses a forensic pharmaceutical risk for pharmacotherapy and an increase in cases of epidemic parotitis. Prior to the COVID-19 pandemic, laboratory-confirmed cases of mumps in England increased to 5,055 cases in 2019. This was the highest number of cases in a decade. In 2020, the number of laboratory-confirmed cases of mumps dropped to 3,215. Preliminary data for 2021 show that there were only 18 confirmed cases [58].

The UK Measles and Rubella Elimination Strategy was launched in 2019. The strategy included a national commitment to achieve and maintain the WHO target of 95% vaccination of five-year-old children [59].

Vaccination practices against diphtheria, tetanus and pertussis in the UK have improved over time from 91% in 2000 to 94% in 2018. Belgium, Greece, Japan, and Portugal have very high whooping cough vaccination rates – more than 98%. In 2018, immunization practices in Austria were 85%, which is the lowest among comparable countries [60].

In England, all girls between the ages of 12 and 13 are offered the human papillomavirus vaccination (HPV) and receive a series of injections over a 12-month period. The vaccine protects against a group of viruses that have been linked to cervical cancer, some rarer anal and genital cancers, and head and neck cancer. Not all types of

cervical cancer are caused by the human papillomavirus. Therefore, the vaccine does not create immunity to cervical cancer, but only to one of its potential causes [61].

Forensic and pharmaceutical risks due to the COVID-19 pandemic caused school closures in England in March 2020. Therefore, immunization programs in schools were suspended. HPV vaccination coverage has fallen sharply, with only 65% of girls aged 13 to 14 receiving the vaccine, compared to 84% in the 2018-2019 school year. However, in the 2020-2021 academic year, the HPV vaccination program was expanded to girls aged 14 to 15 years to make up for missed vaccinations due to the risks of the COVID-19 pandemic. From the 2019-2020 academic year in England, the vaccination program against the human papilloma virus began to be extended to boys aged 12 to 13 [62].

Despite high global vaccination coverage since the early 1990s, there were almost 800 confirmed cases of pertussis in the five years to 2012 [63].

Pertussis vaccination practices among pregnant women in England are not particularly widespread, with coverage at 65% in September 2021 [64].

Forensic and pharmaceutical risks of vaccination practice have affected changes in terms [50, 63, 65].

Forensic and pharmaceutical risks of pharmacotherapy of covid, post-covid and long-covid disorders include pharmaceutical provision of drugs of various clinical and pharmacological, classification and legal, nomenclature and legal groups [66-74].

The WHO recommendations for pharmacotherapy of covid, post-covid and long-term disorders are based on the results of previous studies, observations, and available recommendations for the adult and pediatric populations. The treatment of such patients is difficult due to the presence of mixed infections, comorbid and complicated forms of diseases, the formation of resistance of viruses to chemotherapy drugs, the development of secondary immunological insufficiency, which aggravates the course and outcome of a respiratory infection. Analysis of documented data on the clinical characteristics of the COVID-19 disease caused by the SARS-CoV-2 virus; comparative characteristics of the effectiveness of antiviral and anti-inflammatory drugs made it possible to identify the most promising schemes of pharmacotherapy for patients.

Infection with coronaviruses can exacerbate immunoinflammatory rheumatic diseases, and severe pathology of the immune system and concomitant comorbid diseases can aggravate the infection [75].

According to modern concepts, it is the “hyperimmune” response, and not only the action of the virus itself, that underlies lung damage and mortality in COVID-19 [76].

Among the forensic pharmaceutical risks in the organization of pharmacotherapy of covid, post-covid and long-covid disorders, concomitant diseases noted. So arterial hypertension more than doubles the risk of hospitalization due to COVID-19 infection associated with the omicron variant. Even among fully vaccinated people who received a booster dose of the COVID-19 vaccine. Older age, hypertension, chronic kidney disease, heart attack, heart failure, and time since last vaccination were associated with an increased risk of hospitalization. Patients with arterial hypertension were 2.6 times more likely to need hospital care, even in the absence of other serious chronic diseases [77].

According to the US Centers for Disease Control and Prevention, there was a 15% increase in hospital-acquired infections and deaths due to antibiotic resistance during the first year of the COVID-19 pandemic [78].

Forensic and pharmaceutical risks of pharmacotherapy of covid, post-covid and long-covid disorders indicate an increase in resistance to antifungal and antimicrobial drugs by 26-60% [79].

Forensic and pharmaceutical risks of pharmacotherapy of covid, post-covid and long-covid disorders with increasing resistance to drugs are given in the Table. 1.

Table 1. Forensic pharmaceutical risks of pharmacotherapy of covid, postcovid and long-covid disorders with increasing drug resistance [79].

No.	Infections	Sustainability, overall +%	Hospital start, +%
1.	Resistant to carbapenems Acinetobacter	35	78
2.	Antifungal resistance to Candida auris	60	No data
3.	Carbapenem-resistant enterobacteria	Stable	35
4.	Antifungal resistant Candida	12	26
5.	Enterobacterales producing extended spectrum beta-lactamase	10	32
6.	Vancomycin resistant enterococci	16	14
7.	Pseudomonas aeruginosa with multidrug resistance	Stable	32
8.	Methicillin-resistant Staphylococcus aureus	Stable	13
9.	Antibiotic resistant deaths	18	30

Forensic and pharmaceutical risks of pharmacotherapy of covid, post-covid and long-covid disorders indicate the possibility of risks of ischemic strokes, neurology, Alzheimer's disease, Parkinson's disease, intracerebral hemorrhage, bacterial pneumonia in elderly patients who were hospitalized with COVID-19 [80-82].

Clinical symptoms among patients with COVID-19 [83]: fever (87.9%); subfebrile temperature up to 37.5 C (56.2%); cough (67.7%); shortness of breath (18.6%); fatigue and weakness (38.1%); headache (13.6%); dyspepsia (5%); diarrhea (3.7%). The most common manifestations of severe cases are pneumonia (76%) and hypoxia (38%).

WHO distinguishes the severity of coronavirus infection: mild (involving only the upper respiratory tract), severe (pneumonia, acute respiratory distress syndrome, sepsis, and septic shock), asymptomatic (in 1-3% of patients), moderate (pneumonia without respiratory failure), severe (pneumonia with the development of respiratory failure, very severe (critical) form (pneumonia, sepsis, septic shock, multiple organ failure) [84-86].

Post-covid and long-term disorders of coronavirus disease: pulmonary edema; acute heart failure; acute renal failure; hemorrhagic syndrome, etc. Mortality in COVID-2019 is proportional to the age of patients: from 0% in children under 9 years old to 14.8% in

people over 80 years old. Pregnant women get sick with COVID-19 more easily than with the flu. Approximately 10-15% of mild and moderate cases (81-82% of all infected) become severe. About 15–20% of severe cases become very severe [87].

The category of high risk of mortality from COVID-2019 should include elderly patients with comorbidities, especially those with damage to the cardiovascular system [88].

Pharmacotherapy of non-severe forms of COVID-2019 includes pathogenetic and symptomatic treatment with the use of oral rehydration, antipyretics, cold remedies, etc. In the absence of complications, complete recovery can occur within 7–10 days. Severe and complicated forms of coronavirus infection may require hospitalization and intensive pharmacotherapy [89, 90].

Pharmacotherapy due to the accumulation of antiviral agents is prescribed for patients with COVID-19 with other major diseases (AIDS, viral hepatitis, etc.). It is recommended to take interferon- α preparations, lopinavir in combination with ritonavir [91].

In the case of a viral infection, the cytokine response develops mainly in the Th1 cell type. This plays a crucial role in protection against intracellular pathogens, including viruses [92].

The participation of cytokines produced by Th2 cells is associated with viral persistence and chronicity of the process, while the participation of cytokines produced by Th1 cells is associated with the recovery and elimination of the pathogen [93].

In this situation, the use of a genetically engineered drug makes it possible to prevent the inhibitory effect of the virus [94].

Pharmacotherapy with interferon is recommended due to its broad spectrum of action, known regimens, and few side effects [95].

To prevent COVID-19 coronavirus infection, it is recommended to carry out individual non-specific prevention measures. Irrigation of the nasal mucosa with an isotonic sodium chloride solution reduces the number of both viral and bacterial pathogens of infectious diseases [85].

Pharmacotherapy of current, post-covid and long-covid disorders includes lopinavir, a viral protease inhibitor in combination with ritonavir. Ritonavir inhibits CYP3A-mediated metabolism of lopinavir in the liver, resulting in increased plasma concentrations of lopinavir [96].

Currently, in China, oseltamivir, a drug of the neurominidase inhibitor group (known under the trade name Tamiflu), is used in the pharmacotherapy of coronavirus disease [97].

There is an opinion that antiviral drugs, including neurominidase inhibitors (oseltamivir, paramivir, zanamivir), are not effective for SARS-CoV-2, since the coronavirus does not produce neurominidase [98].

Among other drugs potentially effective against the SARS-CoV-2 virus, remdesivir, arbidol, lamivudine, and chloroquine are indicated [99-101].

It should be noted that it is possible to enhance the effectiveness of pharmacotherapy by introducing immunoglobulins for intravenous administration, blood plasma from recovered patients, etc. [102].

An interesting proposal is the use of available angiotensin 1 receptor blockers (e.g., valsartan) as therapeutic agents to reduce the severity and mortality from SARS-CoV-2 [103].

Risks of anti-inflammatory pharmacotherapy of coronavirus disease cause exacerbation of immunoinflammatory rheumatic and comorbid diseases [104].

Combination pharmacotherapy schemes for COVID-19 are attracting particular attention. Combination pharmacotherapy includes antivirals, anti-inflammatory drugs, glucocorticosteroids, genetically engineered biological agents, and targeted antiseizure drugs [105, 106].

There are significant theoretical backgrounds for “drug repurposing” of some widely used drugs in rheumatology for the treatment of COVID-19 and its complications [107].

The risks of pharmacotherapy and mortality in patients with COVID-19 in the future, the development of severe diseases of the disease and systemic multiple organ pathology led to the ingestion of 4-aminoquinoline ("antimalarial") drugs (hydroxychloroquine, chloroquine) and glucocorticosteroids. Along with antimalarial and immunomodulatory effects, the ability of aminoquinoline drugs to suppress the development of fungal and viral infections, including a wide range of RNA-containing viruses, human immunodeficiency virus, SARS-CoV-1, has been demonstrated. It turned out that treatment with chloroquine leads to a more rapid disappearance of fever, improvement in lung function and a reduction in the recovery period [108, 109].

However, there are other data on the use of pharmacotherapy of hydroxychloroquine, chloroquine [110].

The use of glucocorticosteroids [111] causes considerable controversy. The use of methylprednisolone at doses of 1–2 mg/kg per day can lead to rapid regression of acute respiratory distress syndrome [112].

The possibility of developing a "hyperimmune" pathology in patients with COVID-19, resembling the "cytokine storm" syndrome – hyperproduction of a wide range of "pro-inflammatory" cytokines and chemokines is discussed [113, 114].

Another area of anti-inflammatory pharmacotherapy for COVID-19 is associated with the use of small-molecule chemically synthesized drugs that inhibit intracellular “signaling” molecules, Janus kinases, which have a wide range of anti-inflammatory and antiviral effects [115, 116].

On the background of the pandemic, the role of informing of doctors and pharmacists about forensic and pharmaceutical risks in healthcare practices is increasing. Integrated approaches to the circulation of drugs from the standpoint of forensic pharmacy and the organization of a pharmaceutical case deepen the special knowledge of doctors and pharmacists. The inclusion of drugs of clinical-pharmacological, classification and

legal, nomenclature and legal groups in the regimens of pharmacotherapy of covid, post-covid and long-term disorders contributes to the optimization of treatment [117-121].

The issue of legal support of medical activity in the conditions of a pandemic is also gaining considerable relevance. The implementation of the right thinking, legal awareness, and legal culture of health care professionals in the system of legal relations "doctor-patient-pharmacist-lawyer" do not lose their relevance. The transformation of Ukrainian society to the civilized forms and democratic institutions of the EU is accompanied by the formation of a transparent legal field, promotes the protection of rights and freedoms, will, health and life of citizens, patients, pharmacists, and doctors. Pharmaceutical and medical law is considered as a social institution and a means of implementing legal, political-economic, social, and moral-ethical goals in the health care system [122-125].

Conclusions. The importance of taking into account of the forensic and pharmaceutical risks in the organization of vaccination practices and pharmacotherapy of covid, post-covid and long-covid disorders on the background of the pandemic was noted. Forensic and pharmaceutical risks in the organization of pharmacotherapy of covid, post-covid and long-covid disorders were studied. The standards of vaccination practice against the background of the pandemic were summarized. Scientific sources on the clinical characteristics of SARS-CoV-2, COVID-19 have been systematized. The standards of vaccination practice (immunization, vaccination) of different age categories of the population in the conditions of the COVID-19 pandemic were analyzed. Vaccination practices in Ukraine, England, USA, Belgium, Greece, Japan, and Portugal were studied. Proven that the organization of pharmacotherapy schemes is difficult due to the presence of mixed infections, comorbid and complicated forms of diseases, the formation of virus resistance to drugs, and the development of secondary immunological insufficiency. Noted that infection with coronaviruses can cause an exacerbation of immunoinflammatory rheumatic diseases, and severe pathology of the immune system and accompanying comorbid diseases will aggravate the course of the infection. Forensic and pharmaceutical risks with increasing resistance to drugs are given. Clinical symptoms in patients with COVID-19 were summarized. Post-covid and long-covid disorders of the coronavirus disease were studied. The risks of pharmacotherapy with regard to mortality in patients with COVID-19 due to the development of severe lung lesions and systemic multiorgan pathology were indicated. Schemes of combined pharmacotherapy including antiviral, anti-inflammatory drugs, glucocorticosteroids, genetically engineered biological drugs and "targeted" basic anti-inflammatory drugs were analyzed. The theoretical prerequisites for "repositioning" (drug repurposing) drugs for the treatment of COVID-19 and its complications were indicated. New directions of anti-inflammatory pharmacotherapy of COVID-19 Janus kinase with a range of anti-inflammatory and antiviral effects were noted. Emphasis was placed on the importance of informing doctors and pharmacists about forensic pharmaceutical risks in healthcare practices. The relevance of legal support for medical activity in the conditions of a pandemic was noted. Further research is ongoing.

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