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ORGANIZATION AND MANAGEMENT OF COVID-19 PREVENTION IN OUTPATIENT FACILITIES IN DNIPRO CITY (UKRAINE)

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The purpose of this study is to analyze the effectiveness of existing methods of organization and preventing COVID-19 infection in patients of outpatient clinics in the city of Dnipro and to identify ways to improve them. Methodology and methods of the study are general scientific methods of analysis and synthesis, systematization and comparison, theoretical analysis of literature sources, comparative analysis of international experience, statistical analysis of results. The study identified current problems in the implementation of preventive measures, identified the most effective practices based on the experience of other countries, and proposed a set of practical recommendations for improving the prevention of COVID infection at the local level. The relevance of the study is determined by the urgent need to enhance the effectiveness of health systems in response to the ongoing risks of infectious diseases, particularly in the urban context of Dnipro, where high population density and limited healthcare resources intensify the challenges of disease prevention. The COVID-19 pandemic has underscored the importance of preventive medicine, especially in outpatient clinics, which serve as the first point of contact for most of the population. Efficient preventive strategies at this level not only reduce the incidence of infection but also alleviate the burden on hospitals and emergency services. Furthermore, the study highlights the critical role of social determinants of health in shaping the outcomes of preventive measures. Drawing on insights from medical sociology, it emphasizes the influence of socioeconomic disparities, public trust in healthcare systems, health literacy, and access to medical services on the success of COVID-19 interventions. Incorporating these factors into policy and practice is essential for building resilient local healthcare infrastructures capable of addressing both current and future public health threats. The results of the study can be applied to the organization of preventive work in primary health care facilities, the development of local health care programs, and raising public awareness of viral disease prevention.

Keywords: prevention, management, organization, medical aid, public health system, Dnipro.

COVID-19 profilakses organizēšana un vadība ambulatorajās iestādēs Dnipro pilsētā (Ukraina)

Pētījuma mērķis – analizēt esošo COVID-19 infekcijas organizācijas un profilakses metožu efektivitāti ambulatoro klīniku pacientiem Dnipro pilsētā un noteikt iespējas to uzlabošanai. Pētījuma metodoloģija un metodes ietver vispārzinātniskās analīzes un sintēzes metodes, sistematizāciju un salīdzinājumu, teorētisko literatūras avotu analīzi, starptautiskās pieredzes salīdzinošo analīzi, kā arī rezultātu statistisko analīzi. Pētījumā tika identificētas pašreizējās problēmas profilakses pasākumu ieviešanā, noteiktas efektīvākās prakses, balstoties uz citu valstu pieredzi, kā arī izstrādāts praktisko ieteikumu kopums COVID infekcijas profilakses uzlabošanai vietējā līmenī. Pētījuma aktualitāti nosaka steidzamā nepieciešamība uzlabot veselības aprūpes sistēmu efektivitāti, reaģējot uz turpinātajiem infekcijas slimību riskiem, jo īpaši pilsētvidē, kāda ir Dnipro, kur augsts iedzīvotāju blīvums un ierobežoti veselības aprūpes resursi saasina slimību profilakses izaicinājumus. COVID-19 pandēmija uzsvēra profilaktiskās medicīnas nozīmīgumu, īpaši ambulatorajās klīnikās, kas kalpo kā pirmais kontakta punkts lielākajai daļai iedzīvotāju. Efektīvas profilakses stratēģijas šajā līmenī ne tikai samazina saslimstības gadījumu skaitu, bet arī mazina slimnīcu un neatliekamās palīdzības dienestu slodzi. Turklāt pētījumā tiek uzsvērti sociālo veselības noteicošo faktoru nozīmīgā loma profilakses pasākumu rezultātos. Atsaucoties uz medicīnas socioloģijas atziņām, tiek akcentēti sociāli ekonomisko atšķirību, sabiedrības uzticības veselības sistēmai, veselības prātības un pieejamības medicīnas pakalpojumiem ietekme uz COVID-19 ieviešanas pasākumu sekmīgumu. Šo faktoru iekļaušana politikā un praksē ir būtiska, lai veidotu noturīgas vietējās veselības aprūpes infrastruktūras, kas spēj risināt gan esošos, gan nākotnes sabiedrības veselības apdraudējumus. Pētījuma rezultāti var tikt izmantoti profilaktiskā darba organizēšanai primārās veselības aprūpes iestādēs, vietējo veselības aprūpes programmu izstrādē un sabiedrības informētības palielināšanā par vīrusu slimību profilaksi.

Atslēgvārdi: profilakse, vadība, organizācija, medicīniskā palīdzība, sabiedrības veselības sistēma, Dnipro.

Introduction

The COVID-19 pandemic has become an unprecedented challenge for healthcare systems around the world, demonstrating the vulnerability of even the most developed countries to new infectious

threats. At the same time, it has raised the issue of prevention as one of the key areas in combating the spread of diseases. In the context of high population density in cities and limited resources of medical institutions, it is especially important to organize an effective COVID-19 prevention system at the primary level of health care - in outpatient clinics.

In recent years, the COVID-19 pandemic has further highlighted the importance of the sociology of medicine, drawing attention to how social inequalities and systemic issues affect disease spread, vaccination rates, and health outcomes across different populations.

Sociology of medicine is a subfield of sociology that explores the social dimensions of health, illness, and healthcare. It examines how societal factors – such as culture, socioeconomic status, race, gender, and political structures – influence both individual health outcomes and the organization of medical systems.

One of the key concerns of medical sociology is understanding how health and illness are not just biological phenomena but also deeply shaped by social contexts. For instance, access to healthcare, patient-doctor relationships, health disparities, and public health policies are all influenced by broader social dynamics.

Medical sociologists study topics such as:

- social determinants of health (e.g., poverty, education, environment);
- the structure and function of healthcare systems;
- medical professionalization and ethics;
- patient behavior and compliance;
- health-related stigma and discrimination;
- the impact of pandemics and public health responses.

Importantly, the sociology of medicine also challenges traditional biomedical models by promoting a more holistic understanding of health – one that includes psychological, environmental, and social dimensions.

The relevance of this study is due to the need to improve preventive measures in the post-pandemic period and to adapt international experience to Ukrainian realities. The significance of the topic lies in the practical contribution to improving the level of protection of the population, reducing pressure on the health care system and forming a sustainable culture of infectious disease prevention.

The object of the study is COVID-19 infection. The subject is modern approaches and methods of preventive work on COVID infection among patients of outpatient clinics in Dnipro.

The purpose of the study is to analyze the effectiveness of existing preventive measures in outpatient facilities in the city of Dnipro, as well as to develop practical recommendations for their improvement based on international experience.

Methods and materials

The information base of the work was based on the scientific works of Ukrainian and foreign scholars, textbooks, methodological developments, static data, and Internet sources.

In particular, the research materials include:

1. Regulatory and legal documents:

- orders of the Ministry of Health of Ukraine (No. 1777 of 03.08.2020, No. 1614 of 03.08.2021) on infection prevention and infection control in health care facilities (Ministry of Health 2020; Ministry of Health 2021);
- state standards of Ukraine that regulate the requirements for personal protective equipment.

2. Statistical data:

- annual report on the state of health of the population of Ukraine and the epidemic situation for 2022 (Ministry of Health 2023);

- data from the Center for Medical Statistics and information on the number of COVID-19 cases in Dnipropetrovsk region (Medstat 2023).

3. Scientific publications:

- works on the management and organization of prevention of COVID-19 (Güner et al. 2020; Zhou 2020; Almeida et al. 2020; Simakhova 2025);
- international experience of COVID-19 prevention (Warren et al. 2021; Rajan et al. 2022).

4. Practical resources:

- information on the vaccination campaign in Ukraine (Ministry of Health 2024);
- data on laboratories that test for COVID-19 in Dnipropetrovsk region (Public Health Centre 2023).

Research methods:

1. Analysis of literary sources:

- systematization of scientific works, regulatory documents and statistical data to study the effectiveness of preventive measures.

2. Statistical analysis:

- analysis of data on COVID-19 incidence in Dnipropetrovsk region;
- assessment of the effectiveness of vaccination and other preventive measures based on official statistical reports.

3. Comparative analysis:

- comparison of Ukraine's experience with international practices of COVID-19 prevention.

4. Monitoring methods:

- visual observation of compliance with sanitary and epidemiological standards in healthcare facilities;
- analysis of documentation of health care facilities (e.g., examination logs, reports on the use of protective equipment).

5. Systematic approach:

- assessment of comprehensive prevention measures, including;
- use of personal protective equipment;
- organization of remote consultations;
- implementation of modern technologies, such as artificial intelligence, to monitor morbidity.

6. Graphical interpretation of the results.

Thus, the study is based on a comprehensive approach that combines literature analysis, practical observations, and sociological surveys. The results will help to optimize preventive measures and increase the effectiveness of the fight against COVID-19 in outpatient clinics in Dnipro.

Organization and management of COVID prevention in Dnipro city

Since the first case of COVID-19 was registered in Ukraine (from March 3, 2020, to December 31, 2022), a total of 5,361,770 confirmed cases have been recorded (intensity rate - 14,078.3 per 100 thousand people), 5,219,299 cases of recovery and 110,839 deaths. The course of the COVID-19 epidemic was wave-like, and over the past three years, the country has recorded five waves of the disease, with peaks in February and October-November each year. The first four waves demonstrated a gradual increase in intensity due to the emergence of new SARS-CoV-2 strains. At the same time, the fifth wave, which began in October 2022, acquired the features of a seasonal rise in respiratory infections, peaking at 38-39 weeks, followed by a gradual decline.

In the summer of 2022, there was a significant decrease in the incidence of COVID-19, and at the end of the year, the figures decreased by 35.2% compared to the previous year. Various factors influenced the change in the epidemic activity, including the outbreak of Russia's large-scale armed

aggression against Ukraine, which led to the destruction of medical facilities and limited access to medical care in the occupied territories. This had the greatest impact on the number of registered cases in Donetsk (-53.8%), Luhansk (-57.4%), Kharkiv (-58.1%), Zaporizhzhia (-57.3%), and Kherson (-48.1%) regions. Other important factors were changes in the characteristics of the virus (reducing its ability to spread), quarantine measures, and the effectiveness of vaccination.

In 2022, the mortality rate from COVID-19 in Ukraine tended to decrease. The exception was the 40th week, when, after another peak in the incidence in the 38th week (44,137 cases), the highest number of fatalities was recorded - 208 people. In general, in 2022, there was a decrease in mortality rates in all age groups, but among the elderly, the rates remained high (Ministry of Health 2023).

The Dnipropetrovsk region ranked 4th in terms of the number of cases after Kyiv city, Odesa and Kharkiv region. The high density of cases (4.0 per 100 thousand) indicates the intensity of the virus spread compared to other regions (for example, in Vinnytsia region - 1.2, in Lviv region - 0.4). However, a positive aspect is the high recovery rate (97.2%), which is in line with the national trend. Vaccination played an important role in the prevention of coronavirus infection, which began in Ukraine on February 24, 2021. As of March 6, 2023, a total of 35,215,713 vaccinations were performed, and 16,292,959 people were vaccinated. As of 22.01.2022, 96% of educators (1 million 178 thousand) have received at least one dose of the COVID-19 vaccine, and 91% have received both doses (1 million 113 thousand educators). As of February 2022, more than 90% of healthcare workers have been vaccinated with at least one dose (Ministry of Health 2024).

Prevention of COVID-19 in patients of outpatient facilities in Dnipro city included the following methods:

1. General methods:
 - 1.1. Hand hygiene (washing with soap and water, antiseptics).
 - 1.2. Wearing masks in public places.
 - 1.3. Maintaining social distance (1.5-2 m).
 - 1.4. Ventilating the premises and using bactericidal irradiators.
2. Specific prevention:
 - 2.1. Vaccination. Receiving basic and booster doses of the vaccine.
3. Isolation measures:
 - 3.1. Self-isolation of infected persons.
 - 3.2. Quarantine for contact persons.
4. Testing and monitoring:
 - 4.1 Regular testing (PCR, rapid tests).
 - 4.2. Monitoring of symptoms.
5. Information work:
 - 5.1. Public education on prevention. Distribution of information materials on COVID-19 among patients, in the registry.
 - 5.2. Counteracting the spread of fakes. Informing about fakes and the effectiveness of vaccination, based on the materials of the Ministry of Health of Ukraine.
6. Strengthening immunity:
 - 6.1. Balanced diet, physical activity, sleep.
7. Organizational measures:
 - 7.1. Restrictions on mass events held during 2020-2021 in Dnipro.
 - 7.2. Disinfection of public places.

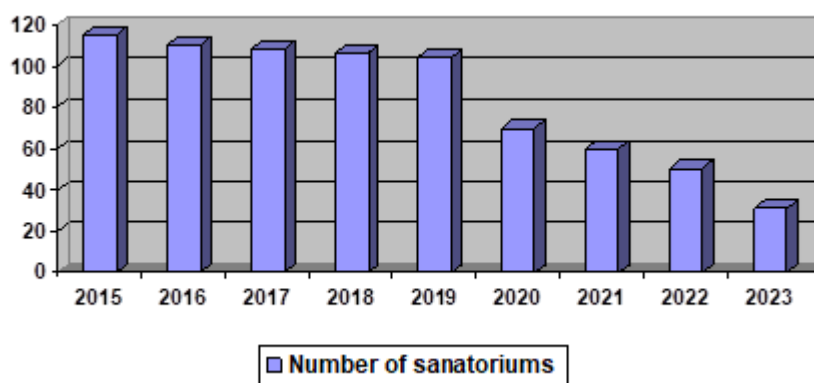
Of course, COVID-19 prevention includes a set of medical, social and organizational measures aimed at reducing morbidity and complications. Among them, physiotherapy procedures, exercise therapy and sanatorium rehabilitation play an important role, helping to boost immunity and recovery

from the disease. That is why it is expedient to analyze data on the activities of physiotherapy departments and sanatoriums in the Dnipro region in 2023 in the context of COVID-19 prevention.

According to the Ministry of Health of Ukraine, in 2023, 34,238,517 physiotherapy procedures were performed in Ukraine, which indicates their significant role in medical rehabilitation. In the Dnipro region, this figure amounted to 3,279,653 procedures (9.6% of the total Ukrainian volume), which ranks the region 3rd after Kyiv and Kharkiv region.

Figure 1

Number of sanatoriums of regional and municipal subordination that were managed by the Ministry of Health of Ukraine by specialty for the period 2015–2023



Source: Medstat 2023.

Based on the data shown in Fig. 1 for the period of 2015-2023, there is a critical decrease in the number of sanatoriums managed by the Ministry of Health in Dnipropetrovsk region:

- in 2015: 7 sanatoriums (2 for adults and 5 for children);
- in 2020-2023: none.

This trend indicates a decrease in opportunities for sanatorium rehabilitation, which is important for patients with COVID-19 consequences, in particular for restoring the functions of the respiratory and cardiovascular systems. The lack of sanatoriums in Dnipropetrovsk region limits accessibility:

- rehabilitation programs for patients with post-COVID-19 syndrome;
- preventive measures for risk groups (elderly people with chronic diseases).

This, in turn, can lead to an increase in the number of complications and a decrease in the quality of life after the infection.

As part of the COVID-19 prevention study, attention should be paid to the laboratories verified by the Ministry of Health that conducted PCR testing (polymerase chain reaction). In the Dnipro region, which is one of the most populated regions of Ukraine, the activities of such laboratories are of particular importance for monitoring the epidemic situation. In Dnipropetrovsk region, the verified laboratories ensured prompt sample processing, which reduces the time between sample collection and results (24-48 hours on average). Timely detection of infected people allowed: isolation of patients, epidemiological investigation (contact tracing).

In Dnipro, there was a network of verified laboratories operating based on: regional medical institutions and private medical centers accredited by the Ministry of Health. In 2023, 20,826,258 PCR tests were performed in Ukraine, of which more than 1 million (approximately 5% of the total) were performed in the Dnipro region. Detection of COVID-19 at an early stage allows to Prevent severe disease; reduce the number of patients with post-COVID syndrome (in 2023, 97.2% of patients

recovered in the region). PCR test data is used to plan rehabilitation measures (physiotherapy, exercise therapy).

The following are the priority areas of COVID-19 prevention for outpatient facilities in Dnipro:

1. Vaccination and revaccination. Mobile points: organization of vaccinations in shopping centers, near transport hubs. Information campaigns: use of social media to combat disinformation (Simakhova et al. 2022). Priority groups: the elderly, patients with COPD, diabetes mellitus - their vulnerability has been confirmed by research.
2. Telemedicine as a tool to reduce the workload. Monitoring chronic patients: remote monitoring of blood pressure and glucose levels via IoT devices.
3. Sanitary and hygienic measures:
 - disinfection of premises: the use of drones to treat public areas (markets, bus stops). The technology is already being used in China and can be adapted for Dnipro;
 - creation of “safe zones” in outpatient clinics.
4. Hygiene education of the population. Conducting trainings on hand hygiene, use of masks, etc. (Stukalo et al. 2022).
5. Optimization of in-hospital protocols in the context of COVID-19 prevention requires a comprehensive approach, including the introduction of innovative diagnostic methods and systematic training of medical staff.
6. Technological innovations. Modern technological innovations in healthcare are actively transforming approaches to monitoring, diagnostics and logistics. This is manifested in the introduction of digital contact tracing platforms such as CDC systems that automate the collection and analysis of data on potential infectious risks; the use of artificial intelligence (AI) to analyze medical images, including CT scans, which significantly increases the speed and accuracy of diagnosis (Pinto-Coelho 2023) and the use of autonomous drones for contactless delivery of medicines to chronic patients, especially the elderly, ensuring safe and efficient logistics even in remote areas. In response to the challenges of the COVID-19 pandemic, numerous countries and cities have developed mobile apps and systems for digital contact tracing, borrowing from the CDC's experience in creating platforms for case management and automated monitoring of infection cases. Powered by Bluetooth Low Energy and GPS, such applications quickly identify close contacts and send users alerts about the risk of exposure, reducing delays in identifying potentially infected individuals. Examples of large-scale implementations include Trace Together in Singapore and Corona 100m in South Korea, where the combination of large data sets with SMS alerts ensured a high response rate of local health authorities. However, the effectiveness of such systems depends on the level of app download: in the United States, for example, only 5.7% of residents downloaded the app, which resulted in a minimal number of contact notifications.

Integration of AI into the process of medical image interpretation, including CT scans, opens new opportunities for early detection of pathologies and increase of radiologists' efficiency. Convolutional neural networks (CNNs) have demonstrated the ability to automatically segment pulmonary nodules from CT scans with an AUROC of 94.4%, which exceeds the performance of six expert radiologists (Pinto-Coelho 2023).

Autonomous unmanned aerial vehicles are becoming an indispensable tool for delivering medicines to chronically ill and elderly patients, especially in remote or inaccessible regions.

7. International experience and its adaptation in outpatient clinics of Dnipro city: analysis of innovative approaches to combating the COVID-19 pandemic. The COVID-19 pandemic has become a global challenge that has forced countries to look for new, effective ways to inform the public, provide healthcare services, and implement preventive measures. Let's look at the experience of four countries – Japan, South Korea, and the United States – that have implemented unique strategies to combat the pandemic that can be adapted in outpatient clinics in the city of Dnipro:

- Japan: using animation to explain social distancing. Japan, known for its culture and art, has used traditional images to inform the public about safety measures. One such example is the use of the image of Amabie, a mythical creature from Japanese folklore that is said to bring prosperity and protect against disease. During the COVID-19 pandemic, the image of Amabie became a symbol of hope and protection, and was widely used in animation, illustrations, and social media to promote social distancing measures and wearing masks.

This approach to informing the population through cultural symbols and animation can be effectively adapted in the city of Dnipro. The use of local cultural images and animations in social advertising can increase public awareness of safety and disease prevention measures.

- South Korea: SMS alerts on new COVID-19 strains. South Korea introduced an emergency SMS notification system to inform citizens about new cases and potential risk areas. These messages contained information about places visited by infected individuals, allowing citizens to avoid potentially dangerous locations. This approach contributed to a rapid public response and reduced the level of infection (Lee, Lee 2020).

In Ukraine, a similar system was implemented through the Diia app, which provided up-to-date information on quarantine restrictions and notifications of contact with infected persons. Further development of such digital tools in the city of Dnipro could increase the effectiveness of communication between the authorities and citizens during emergencies.

- USA: “green certificates and telemedicine. In the United States, “green certificates” were introduced to encourage vaccination and safe attendance at public events - documents confirming vaccination or a negative COVID-19 test result. This allowed event organizers to control access and ensure the safety of participants.

In addition, the Teladoc Health platform has become an important telemedicine tool that helped reduce the burden on hospitals by 25% during the peak periods of the pandemic. Thanks to remote consultations, patients could receive medical care without the need to physically visit medical facilities, which reduced the risk of spreading the virus.

The city of Dnipro also partially used this practice, which contributed to the effective management of medical resources and the safety of citizens during emergencies.

Conclusions

The study confirmed the relevance and significance of the topic of COVID prevention in outpatient clinics in the city of Dnipro. The theoretical analysis of scientific sources and practical data allowed us to comprehensively characterize modern approaches to the prevention of coronavirus infection, in particular through hygiene measures, vaccination, physiotherapy, public awareness and the use of digital technologies.

The study found that effective prevention of COVID infection requires a systematic approach that includes not only medical interventions but also social, educational, and technological components. Particular attention should be paid to vaccination, early diagnosis, health education, physical therapy, and the introduction of new methods such as telemedicine and remote monitoring of patients.

The analysis of the state of prevention of COVID infection in outpatient facilities in Dnipro showed both positive changes - active implementation of vaccination, use of exercise therapy and functioning of testing laboratories - and identified problematic issues: insufficient infrastructure for rehabilitation, limited sanatorium treatment, uneven awareness of preventive measures among the population. Public participation and communication with city residents play a significant role in this process.

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