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# LANDSCAPE ASSESSMENT OF TELEMEDICINE IN UKRAINE

March 2023

LOCAL HEALTH SYSTEM SUSTAINABILITY PROJECT

**Local Health System Sustainability Project**

The Local Health System Sustainability Project (LHSS) under the USAID Integrated Health Systems IDIQ helps low- and middle-income countries transition to sustainable, self-financed health systems as a means to support access to universal health coverage. The project works with partner countries and local stakeholders to reduce financial barriers to care and treatment, ensure equitable access to essential health services for all people, and improve the quality of health services. Led by Abt Associates, the five-year, $209 million project will build local capacity to sustain strong health system performance, supporting countries on their journey to self-reliance and prosperity.

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# ACRONYMS

| | |
|---|---|
| **CT** | Computerized tomography |
| **DICOM** | Digital Imaging and Communications in Medicine |
| **DOT** | Directly Observed Therapy |
| **DRG** | Diagnosis-related group |
| **EMR** | Electronic medical record |
| **EU** | European Union |
| **FGD** | Focus group discussion |
| **GDPR** | General data protection regulation |
| **GOU** | Government of Ukraine |
| **HL7 FHIR** | Fast Healthcare Interoperability Resources |
| **ICD** | International Classification of Diseases |
| **ICPC-2** | International Classification of Primary Care |
| **IT** | Information technology |
| **LHSS** | Local Health System Sustainability Project |
| **MIS** | Medical information systems |
| **NHSU** | National Health Service of Ukraine |
| **MOH** | Ministry of Health |
| **PHC** | Primary health care |
| **PMG** | Program of Medical Guarantees |
| **SOE eHealth** | State-Owned Enterprise eHealth |
| **TB** | Tuberculosis |
| **USAID** | U.S. Agency for International Development |

# GLOSSARY

**Communal health care facilities:** health care facilities owned by a local council (oblast, raion, city). They provide medical services based on a license from the Ministry of Health.

**Private health care facilities:** health care facilities owned by a private person/company. In order to provide medical services, they receive an appropriate license from the Ministry of Health.

**Private entrepreneurs:** persons who have an entrepreneur certificate and provide medical services based on a license issued by the Ministry of Health.

**State health care facilities:** health care facilities owned by the State. In order to provide medical services, these facilities receive an appropriate license from the Ministry of Health.

**Teleconsultation:** synchronous or asynchronous consultation using information and communication technology to omit geographical and functional distance (Deldar, Bahaadinbeigy, and Tara 2016).

**Telemedicine:** the delivery of health care services, where distance is a critical factor, by all health care professionals using information and communications technologies for the exchange of valid information for diagnosis, treatment, and prevention of disease and injuries, research and evaluation, and the continuing education of health care workers, with the aim of advancing the health of individuals and communities (Dasgupta and Deb 2008).

**Telemetry:** a set of technologies that make it possible to carry out remote measurement, collection, and transmission of information about the performance indicators (physiological parameters) of the patient's body (Ministry of Health of Ukraine, Order 681, 19 November 2015, https://zakon.rada.gov.ua/laws/show/z1400-15#Text)

# EXECUTIVE SUMMARY

## INTRODUCTION

Alongside comprehensive health finance reform efforts of the past six years, the Ukrainian health system has advanced digital solutions such as an eHealth system and the nascent but growing use of telemedicine. Telemedicine poses potential benefits to increase efficiency and transparency, reduce opportunities for corruption, and expand access to quality health services. The full-scale Russian invasion of Ukraine in February 2022 and the resulting massive population displacement and attacks on health facilities have increased telemedicine's potential to restore and maintain access to health care. This report provides results of a USAID Local Health System Sustainability Project (LHSS) assessment of the status of telemedicine in Ukraine, conducted from September to November 2022 and including data gathered from nearly every region of Ukraine.[1] Its purpose is to inform policy makers, development partners, and other stakeholders of the current state of telemedicine, including: identifying the populations that could benefit most from telemedicine expansion; priority services for that expansion; and the status and gaps in infrastructure, the enabling environment, and financing of care. It also identifies barriers to expanding telemedicine and strategic investments that would foster expanded access, reconnecting Ukrainians to health care, and supporting the long-term strength and resilience of the health system.

## FINDINGS

### PRIORITY POPULATIONS AND SERVICES

Potential vulnerable groups were divided into two buckets: war-related vulnerable groups, including internally displaced people and people living in occupied and recently de-occupied territories; and regular vulnerable groups, including people with disabilities, people living in rural areas, older adults, and people with chronic diseases, including mental health conditions. Findings confirmed that vulnerable populations which faced barriers to in-person health care services even before the full-scale war (such as rural populations, the elderly, and the disabled) stand to benefit greatly from telemedicine. Out of these groups, the elderly and patients with chronic diseases people living in occupied and recently de-occupied territories could benefit most from increased access to care provided via telemedicine.

In the first 9 months of 2022, the most active users of telemedicine services were patients with chronic conditions such as cardio-vascular diseases, bronchial asthma, and diabetes mellitus as well as patients with infectious diseases. Internally displaced people and people living in occupied and recently de-occupied territories also more frequently used telemedicine services. The assessment found that methods used by patients most commonly include telephone calls, messengers, chatbots, or zoom calls as telemedicine methods to get online consultations, e-prescriptions, and e-referrals.

Patients who used telemedicine services were generally satisfied with their quality. However, in some instances, the following barriers prevented or complicated patients' use of telemedicine:

[1] Researchers were not able to collect data from the temporarily occupied Autonomic Republic of Crimea and Sevastopol city.

1. **Lack of information about availability and eligibility.** Patients often do not know that they can request telemedicine services and receive them free of charge, even within the PMG.
2. **Perceived lack of tools for service provision**. Both patients and providers stated that they often lack the means to provide/receive care via telemedicine. This stems from the notion that telemedicine services should be provided using special equipment, and regular cell phones are insufficient for that purpose. However, some of the telemedicine services, such as e-prescription and e-referral, can be readily provided without any special equipment. Additionally, audio and text consultations can be arranged via cell phone.
3. **Poor internet connection.** Even a regular cell phone requires a stable internet connection to organize video calls and use the chatbot. This problem is particularly acute in many rural districts, where both an internet connection and mobile network coverage are lacking.

According to a 2022 study, 70 percent of Ukrainians reported feeling stressed (Ukrainian Medical Magazine 2022). To overcome this challenge, First Lady Olena Zelenska launched the National Program of Mental Health and Psychosocial Support. The potential benefits of greater use of telehealth for mental health care are also clear from international experience, particularly since the onset of the COVID-19 pandemic. As users of telemedicine solutions and infrastructure, health care providers recognize the benefits of telemedicine and claim to be ready and interested in expanding their use of such methods. Inhibitors include a lack of knowledge of the technology and methods available, a perceived lack of demand from patients, an outdated policy framework, and a lack of financial incentives.

Telemedicine services are provided in facilities of all health care types covered by the assessment: primary, specialized (outpatient and inpatient), and emergency care. Most telemedicine services delivered by the PHC providers were consulting, writing prescriptions, addressing fatigue symptoms, and various administrative procedures (approving sick leave, issuing medical certificates etc.). Health care professionals emphasized that the greatest benefits of telemedicine for patients are better continuity of health care, sustainable patient-doctor relations, and higher treatment compliance. Important to note, over half the PHC providers surveyed indicated that, to practice telemedicine, they had to either purchase the needed devices with their own money or use their personal phones, computers, and other devices.

## TRENDS AND RECENT EXPERIENCES IN TELEMEDICINE USE

### Telemedicine experiences in Ukraine

Dnipropetrovsk, Lviv, Odesa, and Poltava oblasts demonstrate the most proactive use of telemedicine in the public sector than other regions. They have telemedicine centers operating in public sector health care facilities and widespread use of doctor-doctor consultations. Despite this success, it remains unclear whether this model can be replicated in the likely post-war context of constrained government resources. This study did not find increased use of patient-doctor consultations in regions in which telemedicine centers are functional in comparison with regions that do not have them.

Odesa oblast is one of the most advanced regions in telemedicine development and implementation. There is a separate Regional Center of Telemedicine organized in 2019 in the Odesa Oblast Clinical Hospital by the Oblast Health Care Department Initiative. Though medical staff initially doubted telemedicine's value, once doctors familiarized themselves with the concept and saw how it facilitates the delivery of health care services, they started to use it properly and consider it a great achievement. Lay people similarly reported that telemedicine

saves time and facilitates specialist consultations and health professionals. Success factors included the provision of high-quality trainings on the processes and logistics, tailored tutorials instructing how to use telemedicine equipment, and equipped hospital telemedicine cabinets.

In 2022, regions that experienced active war hostilities recorded the highest share of telemedicine service utilization. Examples are Kyiv, Chernihiv, Sumy oblasts (fully liberated), Kharkiv, Kherson oblasts (partially liberated), and Luhansk oblast (active hostilities continue). In these regions, the provision of in-person medical care was inhibited due to internal migration of the population, destruction of health facilities, and restrictions on movement due to the danger involved. Across the regions, health professionals with experience using telemedicine agree it facilitates the provision of medical services for patients and helps doctors receive a second expert opinion from their colleagues. To implement telemedicine projects successfully, study participants cited the following lessons:

- **Leadership and strategic planning are important for success.**
- **Clearly defined business processes of telemedicine provision are crucial.**
- **Clear coordination of consultation between primary and specialist care.**
- **Telemedicine should be included in NHSU contracts and, if possible and appropriate, the introduction of financial incentives for health care providers.**
- **Sufficient investment, regulation, and infrastructure are strong facilitators of successful telemedicine implementation.**

## Recent trends

Restrictions in access to health care in response to the COVID-19 pandemic increased demand for telemedicine services. Patients and doctors increased the use of telemedicine services because closure of inter-city and regional transport communication and the need to have a special pass for moving around reduced opportunities for in-person primary and specialized medical care. Telemedicine services began appearing gradually and sporadically across the country to address these challenges, but has rapidly increased since the onset of Russia's full-scale war against Ukraine. In one example, doctors united in professional communities that provided Ukrainian citizens medical consultations online and free of charge via messengers or international platforms.

In 2022, the most frequently used types of telemedicine across Ukraine included video consultations, sharing of medical data, audio consultations, text consultations, and health services related to the use of individual measuring devices (telemetry). These services were provided in each type of facility.[2] When the share of telemedicine services as a percentage of the total number of EMRs is compared across health care facility types, we find that private health facilities and private entrepreneurs provide a much higher percent of total services through telemedicine.

[2] More information can be found in Figure 8: Use of Telemedicine Methods in Health Facilities by Type of Ownership over the Past 12 Months

One more recent telemedicine project was established after Russia's full-scale aggression against Ukraine. It facilitated psychological consultations by creating databases of doctors who were willing to consult online free of charge. Patients' organizations then disseminated this information among their members. This project helped people receive mental health support via their phone when it was needed the most. Moreover, the databases provided an opportunity for patients to choose specialty doctors and contact them directly. Another example is the Dobrobut private network of polyclinics, which launched a telegram bot for patient consultations and a telemedicine platform to enable greater access to health care since the Russian invasion.

## ENABLING ENVIRONMENT AND STAKEHOLDERS

The Ukrainian Ministry of Health (MOH) and the eHealth State-Owned Enterprise are responsible for the development and implementation of telemedicine, information, and information-telecommunication systems for the health care system in Ukraine. The MOH is responsible for strategic planning and coordination of stakeholders' efforts aimed to support telemedicine development there. Other institutions are responsible for the organization and provision of (i) medical care in specific territorial communities or for certain population groups, (ii) infrastructure, and (iii) telecommunication solutions. The monitoring function of telemedicine services has not been found to be a direct obligation of any stakeholder.

The Government of Ukraine is taking important steps for telemedicine's development. This is reflected in (i) the development and approval of regulatory acts specifying the provision of medical care based on telemedicine technologies, (ii) the creation of a working group to develop the concept of telemedicine implementation in Ukraine, and (iii) the Government's active support of telemedicine initiatives.

Medical professionals who participated in an online survey indicated obstacles that affect their readiness to provide medical services via telemedicine. These obstacles are divided into several categories, such as political and regulatory (outdated legislation, lack of clearly defined roles and responsibilities of medical professionals), informational and organizational (lack of information and algorithms on the use of telemedicine), financial (fragmented financing of telemedicine infrastructure and unclear financial incentives for providers), personnel (lack of knowledge and skills, reduction of human resources) and infrastructure (poor internet connection, lack of specialized telemedicine equipment and interoperability between medical information systems of different facilities). The main opportunities for the development of telemedicine lie in the elimination of these obstacles.

## INFRASTRUCTURE AND TECHNICAL REQUIREMENTS

### Technical requirements

Before the full-scale invasion of Ukraine, the technical conditions for telemedicine development were broadly favorable. Internet access and mobile phone coverage was widely distributed, and most healthcare facilities were provided with computers. However, since the onset of the full-scale Russian invasion, there have been frequent interruptions to the power supply and internet services. While back-up systems mitigate the impact these interruptions have on doctor-to-doctor telemedicine services, doctor-to-patient consultations are more affected as patients lose power, internet, and mobile services intermittently without similar back-up generators.

### Financing telemedicine infrastructure

Currently, facility owners such as subnational governments, communities, and the private sector are responsible for investing in technologies that would expand access to telemetry and telehealth visits (especially for mental health care). While the Government of Ukraine is responsible for investment in telemedicine service delivery, it remains unclear if it will be a priority during the war and reconstruction, especially as financing of telemedicine projects by the private sector and international donors has increased during wartime. Additionally, donors provide equipment that can be used for providing free telemedicine services. The participation of state and local authorities in the procurement of telemedicine equipment has been insignificant or altogether absent, which is a result of reprioritization of budget expenditure during the martial law.

### Standards

For Ukraine, it is also important to adopt and expand on existing use of international standards for compatibility, exchange, storage, and use of medical information to ensure that the relevant hardware and software tools transmit medical information promptly, efficiently, and securely. The following international standards are proposed for full adoption and implementation:

- HL7 FHIR (Fast Healthcare Interoperability Resources)
- OpenEHR (Open Electronic Health Record)
- ISO/IEC 27001 (standard for information security management systems (ISMS))
- European Union (EU) General Data Protection Regulation (GDPR)
- DICOM (Digital Imaging and Communications in Medicine)

## RECOMMENDATIONS

The authors close by making recommendations to help policymakers push three strategic levers during the ongoing war and in the following reconstruction period.

**To address barriers to accessing vulnerable populations:**

1. *Conduct information campaigns on telemedicine availability and eligibility.*
2. *Identify and address policy and process barriers to patient access.*
3. *Improve access to basic telemedicine tools for doctors and patients.*

**To strengthen the enabling environment and foster growth of telemedicine:**

4. *Prioritize Telemedicine Strategy and Investment at the national level.*
5. *Revise PMG packages to clarify and standardize terminology, and define requirements and purchasing arrangements for services using telemedicine.*
6. *Establish an institutional framework for monitoring service utilization via telemedicine.*
7. *Conduct a study to explore costs and funding sources of telemedicine services and infrastructure to inform PMG purchasing arrangements for financing telemedicine within the PMG.*

**To address critical infrastructure needs:**

8. *Explore interoperability for telemedicine solutions and data storage.*
9. *Prioritize standards for compatibility, exchange, storage, and use of medical information.*

## CONCLUSION

Ukraine has an opportunity to leapfrog the development of telemedicine as a tool to reconnect patients to essential services, and even to expand care, especially to those with chronic and infectious diseases and mental health needs. Crises create space for development by stimulating out-of-the-box solutions. The Government of Ukraine, and other key stakeholders, can support strategic investments and technical support to turn war time challenges and experiences into a stronger more resilient health system with fully integrated digital solutions optimizing limited health financing resources and reducing barriers to accessing care among the population.

# INTRODUCTION

There is general recognition of the potential of telemedicine to expand access to services in Ukraine during the war, reconstruction, and beyond. Yet as of 2022, data on the use, demand, and other aspects of the state of telemedicine in Ukraine was disparate, incomplete, and insufficient to inform policy and investment decisions. The United States Agency for International Development (USAID)-funded Local Health System Sustainability (LHSS) project, together with Patients of Ukraine and the Ukrainian Healthcare Center, conducted a holistic landscape assessment of telemedicine in Ukraine to increase understanding of the current status, potential, and needs of telemedicine among the Government of Ukraine (GOU), development partners, and other private and public sector health sector stakeholders. This assessment provides a comprehensive overview of telemedicine development in Ukraine, including its infrastructure, financing, regulatory environment, service utilization trends, and demand for expanded services. Policy makers can use this information to inform critical decision-making both during the ongoing war and in the following reconstruction period.

**The WHO defines telemedicine as:**

The delivery of health care services, where distance is a critical factor, by all health care professionals using information and communications technologies for the exchange of valid information for diagnosis, treatment, and prevention of disease and injuries, research and evaluation, and the continuing education of health care workers, with the aim of advancing the health of individuals and communities (Dasgupta and Deb 2008).

Telemedicine offers a promising opportunity for improving access to health care for many reasons. For example, in the management of chronic conditions, it allows health care professionals to continuously monitor adherence to medication protocols while patients can remain in their own home and include family members in their consultations (Corbett, Opladen, and Bisognano 2020). Use of remote teleconsultations minimizes transportation costs for patients and for health providers. It also fosters transparency in providing medical services because it reduces opportunities for informal payments, which typically occur in person. And telemedicine enables local providers to consult directly with distant specialists.

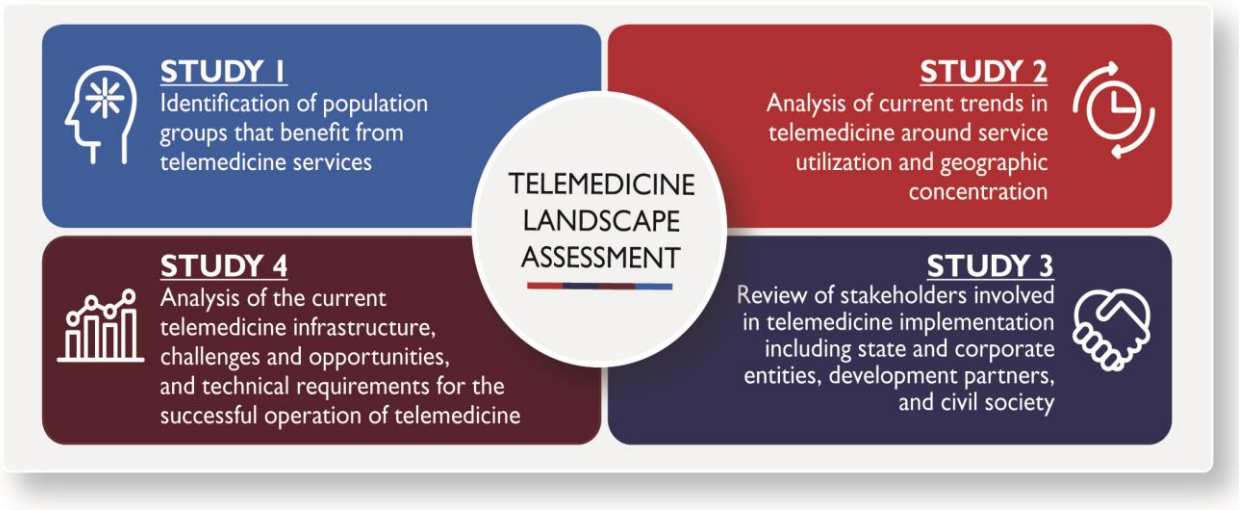
Since Ukraine embarked on comprehensive health financing reform in 2017, telemedicine has emerged as a vehicle for provision of care. The use of telemedicine has potential to strengthen efficiency in the health sector, increase transparency, and expand access to quality health services. The Russian invasion of Ukraine exacerbated preexisting health needs of the population and constrained the country's health care system, making telemedicine a critical tool in maintaining access to health care. The opportunity for patients to receive appropriate treatment even when a specialist is not available in person has been critical as many doctors have been displaced and even fled the country. Despite this, telemedicine's growth remains in relatively early stages.

# METHODOLOGY

## RESEARCH METHODS

This assessment was conducted by LHSS partners, the *Patients of Ukraine* Charitable foundation and the Ukrainian Healthcare Center, between September and November 2022. The assessment had four research objectives delivered through four studies (Figure 1).

**Figure 1. Telemedicine Landscape Assessment Components**



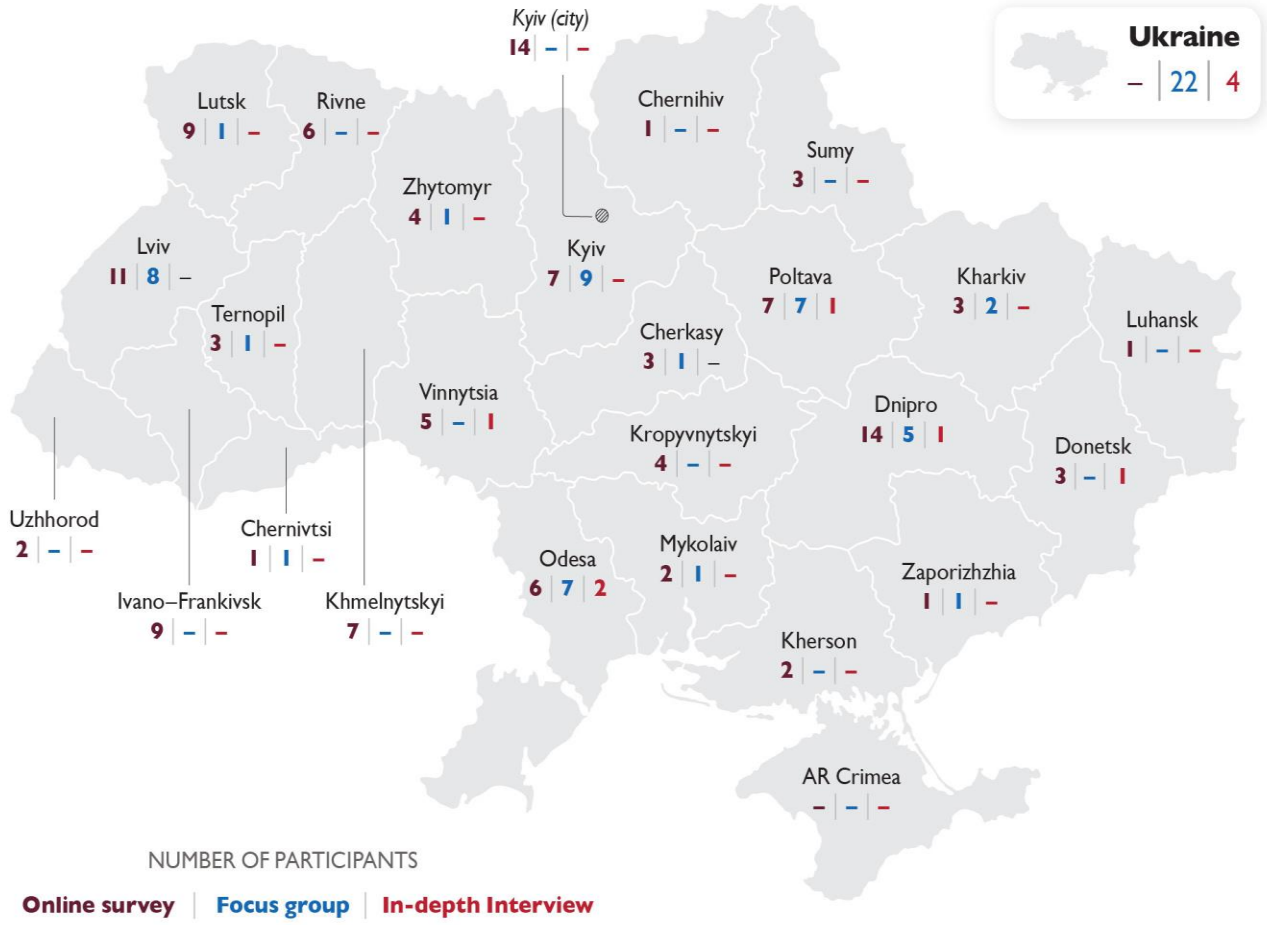

The studies used mixed methods combining primary and secondary data collection and analysis:

1. *Desk research* – The team conducted a comprehensive review of 200 documents including existing literature from peer-reviewed journals, national assessments, policy documents, and telemedicine programs. The team also analyzed NHSU data for the period January – September 2022.
2. *Focus group discussions* – The team held 11 focus group discussions (FGDs) that comprised 67 participants (23 male and 44 female). Participants included representatives of: 14 national and regional patients' organizations; 11 family doctors, pediatricians, and family doctors in managerial positions; 29 health care professionals from the five focus regions described below, including representatives of primary health care (PHC), specialized, and emergency facilities, oblast health care departments, and the National Health Service of Ukraine (NHSU) Interregional departments; 6 telemedicine software and equipment companies; and 7 national and subnational government representatives.
3. *In-depth interviews* – The research team held 10 key informant interviews with health sector experts with experience in telemedicine from the World Bank, the Medical Center of Telemedicine of the Ministry of Health of Ukraine (MOH), International Scientific and Educational Center of Information Technologies and Systems of the National Academy of Sciences of Ukraine, the Telemedicine Center of the Poltava Oblast Center for Emergency Medical Aid and Disaster Medicine, Vinnytsia Oblast Center for Emergency Medical Aid and Disaster Medicine, the State-Owned Enterprise (SOE) eHealth, and representatives from the military medical sector.

4. *Online survey* – The team sent an online survey link using ODK software to health facility managers who then shared it with others through the snowball sampling method. A total of 128 respondents (122 doctors and 6 representatives of other medical staff) completed the survey across 25 regions of Ukraine, except for the temporarily occupied Autonomous Republic of Crimea and the city of Sevastopol.

Interviews, FGDs, and quantitative surveys are traditionally conducted in person. However, due to the ongoing Russian invasion, the team adapted the data collection methods to minimize risks to participants. The researchers primarily used phones or digital solutions to collect the data. The study carried out an *ex-ante* risk assessment and developed a Data Security Plan, which was reviewed by Abt's Institutional Review Board. In-depth interviews and FGDs were organized virtually in real-time mode and recorded using the Zoom for Government platform, transcribed using MS Word, and analyzed using ATLAS.ti software. Researchers shared the survey link and invitation letters, along with requests for consent so that participants confirmed that their participation was voluntary, and that they knew that information shared during the study was confidential and no names would be used in the reports. Figure 2 details distribution of participants and respondents by region by type of data collection method:

**Figure 2. Distribution of Respondents by Region and by Data Collection Method**



Most online survey participants—80 participants out of 128 (63 percent) —work in PHC facilities, with the rest coming from specialized (34 percent) and emergency (3 percent) medical facilities. Participants hailed from all ownership types, although the majority—96 responses out of 128 (75 percent)—work in communal health facilities, as depicted in Figure 3.[3] Figure 4 depicts percentages of respondents in city, village, town, and urban-type settlements.

**Figure 3. Health Providers Surveyed: Places of Work, Percent**

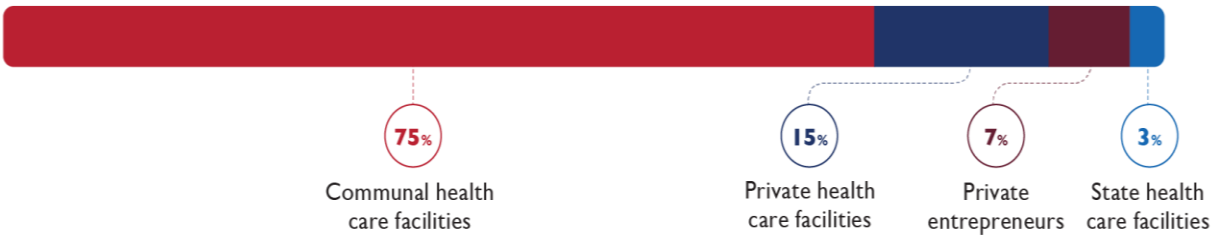
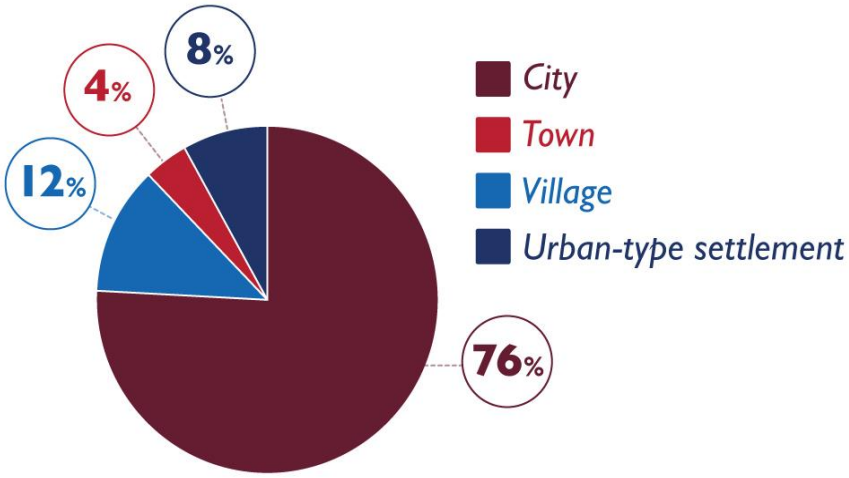



**Figure 4. Geography of Respondents, Percent**




Focus regions were selected considering these inclusion criteria: experience in implementing telemedicine services; affected by mass attacks on health care infrastructure; amount of damage from mass attacks; high proportion of internally displaced people; safety of the region for conducting the study; Ukrainian government and sovereignty; geographical availability/physical access to medical services. As a result, five were chosen for the study: Dnipropetrovsk, Kyiv, Lviv, Odesa, and Poltava oblasts.

[3] In Ukraine, a “communal health facility” is a nonprofit health facility founded and owned by local authorities such as a 'community' (*hromada*), city, raion or regional (*oblast*) authorities.

## STUDY LIMITATIONS

Study limitations experienced and corresponding mitigation measures and actions to maintain quality and minimize bias are outlined below.

**Restricted access due to ongoing missile air strikes, shelling resulting in power outages, and fluidity of the population**. The ongoing air strikes by Russian troops led to loss of life, closure of institutions, forced migration of populations to safe locations, power outages, and reduced internet connectivity. These multifaced challenges heavily influenced the design of the assessment as some of the locations were physically inaccessible. Virtual FGDs had to be postponed several times due to power outages and loss of internet connectivity as Russian missiles targeted Ukrainian energy infrastructure. Instead of conducting in-person interviews, researchers used phones and digital solutions such as Zoom for Government to collect data. The research was also challenged in accessing some government data, as government offices were under stress and less responsive, given war-related challenges such as staff shortages and competing urgent priorities of keeping the health system functioning.

**Limited availability and access of telemedicine information**. There is limited telemedicine data in Ukraine. Data on access to medical services by vulnerable populations is not included in eHealth. Information on the number and need for telemedicine services by the type of doctor-to-doctor interaction was not recorded in the eHealth system. Researchers used data available from the SOE eHealth and from NHSU. The assessment used the ICD-10 diagnosis to group a certain number of medical records, up to level 2. ICD-10 has five levels of grouping, and thus the analysis did not capture all diagnoses.

**Limited comparability with historical data due to migration as a result of the invasion.** Given the significant migration caused by the full-scale Russian invasion, the eHealth data were not comparable with historical demographic and geographical distribution of the population.

**Lack of outcomes data on telemedicine**. The authors planned to include outcomes data from telemedicine programs but these data were not readily available. However, information on the outcomes of implementation, such as improved patient health or geographic access to services (physical and in-person access), is quite limited. Since most of the analyzed sources contain information about a limited period of time, it is not possible to draw an unequivocal conclusion that telemedicine solutions implemented by 2020 are currently functioning. Additionally, as telemedicine has not been researched widely in Ukraine, the literature review relied on grey literature (literature which was published informally, non-commercially, or remained unpublished) and pilot telemedicine program documents.

# FINDINGS

The findings of this landscape assessment are summarized below, grouped according to key areas of research including identifying priority services and populations; uncovering lessons from experiences across Ukraine and current trends; and assessing opportunities and challenges in the current enabling environment (including provider readiness) and infrastructure requirements.

## PRIORITY POPULATIONS AND SERVICES

The assessment found that telemedicine is widely used in different forms throughout Ukraine. Current utilization patterns provide a view into populations that can most benefit from continued and expanded access to care via telemedicine, and the services that lend themselves to that mechanism.

### SERVICES AVAILABLE IN DIFFERENT TYPES OF HEALTH CARE FACILITIES

The NHSU data [4] as well as online survey results, FGDs, and in-depth interviews show that telemedicine services are provided in facilities of all types of health care covered by the survey: primary, specialized (outpatient and inpatient), and emergency care using several telemedicine methods (Table 1).

**Table 1: Availability of Telemedicine Methods by Type of Care**

| Telemedicine method | Type of care | | | |
|---|---|---|---|---|
| | Primary | Specialized outpatient | Specialized inpatient | Emergency |
| Video consultation | + | + | + | - |
| Text consultation (consultation in correspondence format, including chatbots solutions) | + | + | + | - |
| Audio consultation | + | + | + | + |
| Transmission of diagnostic data | + | + | + | + |
| Description of the results of diagnostic X-ray examinations and medical images | + | + | + | + |
| Use of remote personal diagnostic devices | + | - | + | - |

[4] As for the NHSU data, only the service of patient counseling by means of telecommunication provided in primary and specialized health care facilities has been analyzed. In this landscape assessment, such services are also referred to "telemedicine services".

## TELEMEDICINE SERVICE PROVISION BY HEALTH CARE FACILITY OWNERSHIP

Telemedicine services are recorded in the electronic medical records (EMRs) of health care providers. According to data from the NHSU for the period January-September 2022, communal health facilities provided 93.87 percent of all telemedicine services (almost 4.84 million unique services out of 5.16 million total). Private health facilities and private entrepreneurs provided a very small percentage in comparison, respectively 2.62 percent (135,250 services) and 3.49 percent (180,332 services). State-owned facilities provided the fewest services at only 817 (0.02 percent). When the share of telemedicine services as a percentage of the total number of EMRs is compared across by health care facility ownership, we find that private health facilities and private entrepreneurs provide a much higher percent of total services through telemedicine than state and communal ones.[5] This may indicate more intensive use of teleconsultations in privately owned health care facilities. For a breakdown of telemedicine service provision by type of health care facility, see Table 2.

**Table 2: Electronic Medical Records (EMRs) (incl. consultations with communication means) in Health Care Facilities by Ownership Type, January - September 2022, *NHSU data***

| Health care facility ownership type | Number of EMRs per facility type | Share of EMRs among other facility types, % | Number of telemedicine consultations per facility type | Share of telemedicine consultations among other facility types, % | Share of telemedicine consultations among total EMR entries per facility type, % |
|---|---|---|---|---|---|
| State | 364,737 | 0.33 | 817 | 0.02 | 0.22 |
| Communal | 106,740,463 | 96.21 | 4,844,490 | 93.87 | 4.54 |
| Private (excluding private entrepreneurs) | 2,295,021 | 2.07 | 180,332 | 3.49 | 7.86 |
| Private entrepreneur | 1,543,192 | 1.39 | 135,250 | 2.62 | 8.76 |
| **Total** | **110,943,413** | **100.00** | **5,160,889** | **100.00** | **4.65** |

[5] "State-owned" refers to nationally owned facilities, that general provide highly specialized care and funded directly by the Ministry of Health. Communal health care facilities are owned by local authorities and provide most of health care serviced under the PMG Program.

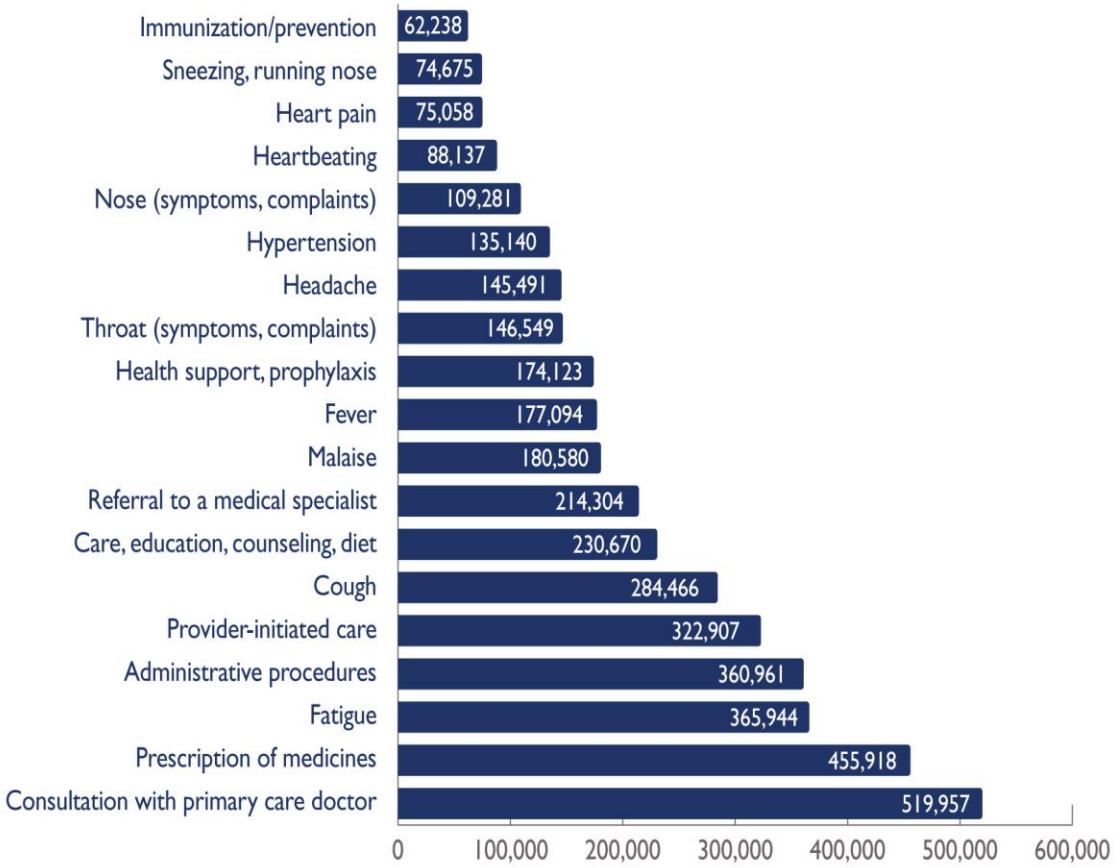
## MOST FREQUENTLY USED TELEMEDICINE SERVICES

Two types of data were used to analyze consultations by communication means:

- Reasons for medical care requests according to ICPC-2 (6.14 million EMRs), and
- Disease Class under the ICD-10 (2.44 million EMRs)[6].

More than 12 percent of EMRs related to the PHC and coded according to ICPC-2 demonstrate that patients used telemedicine to receive medical care (12.48 percent, or 6.14 million out of 49.18 million records). Most telemedicine services by the PHC providers were consultations, issuing medicine prescriptions, addressing fatigue symptoms, and various administrative procedures (issuing sick leave and medical certificates etc.). Details on the most frequent reasons for requesting PHC services provided by communication means are presented in Figure 5. Representatives of all regions in FGDs stated that the most common teleconsultations have been with patients who have heart conditions and acute respiratory diseases.

**Figure 5. The most frequent reasons for requesting PHC services provided by communication means, January-September 2022, *NHSU data***




[6] These figures do not correlate unequivocally with primary and specialized levels of care, because during one visit, the doctor may indicate several ICD or ICPC codes (the main code, concomitant codes, and complications codes). In addition, at the PHC level after encoding the reasons for medical care according to ICPC-2, doctors may also indicate an ICD-10 code. Therefore, for correct conclusions, consultation data by means of communication based on ICPC-2 and ICD-10 were analyzed separately.

Almost four percent of records (or 2.4 million out of 61.8 million records) of specialized care demonstrate the use of telemedicine. Telemedicine services as a percentage of total number of EMR entries related to different classes of diseases according to ICD-10 classification shows telemedicine services were used more intensively within some disease classes (see Table 3 for details).

**Table 3: Records on some disease classes with more than average (3.94 percent) share of records about consultation with communication means from general number of records, January-September 2023**

| Class of diseases according to ICD-10 classification | Number of records on this class | | Share of records about consultation with communication means, % |
|---|---|---|---|
| | General | Consultations with communication means | |
| Class XXII. Codes for special purposes (COVID-19 etc.) | 423,516 | 359,534 | 84.79 |
| Class I. Certain infectious and parasitic diseases (TB, HIV, etc.) | 2,447,403 | 412,667 | 16.86 |
| Class IX. Diseases of the circulatory system (hypertension, myocardial infarction, etc.) | 4,849,584 | 343,751 | 7.09 |
| Class X. Diseases of the respiratory system (asthma, influenza, pneumonia, etc.) | 2,965,488 | 206,350 | 6.96 |
| Class IV. Endocrine, nutritional, and metabolic diseases (diabetes, etc.) | 2,574,276 | 160,945 | 6.25 |
| Class XVII. Congenital malformations | 306,798 | 15,868 | 5.17 |
| Class XVIII. Symptoms, signs, and abnormal clinical and laboratory findings, not elsewhere classified | 449,961 | 21,667 | 4.82 |

*Source: NHSU data*

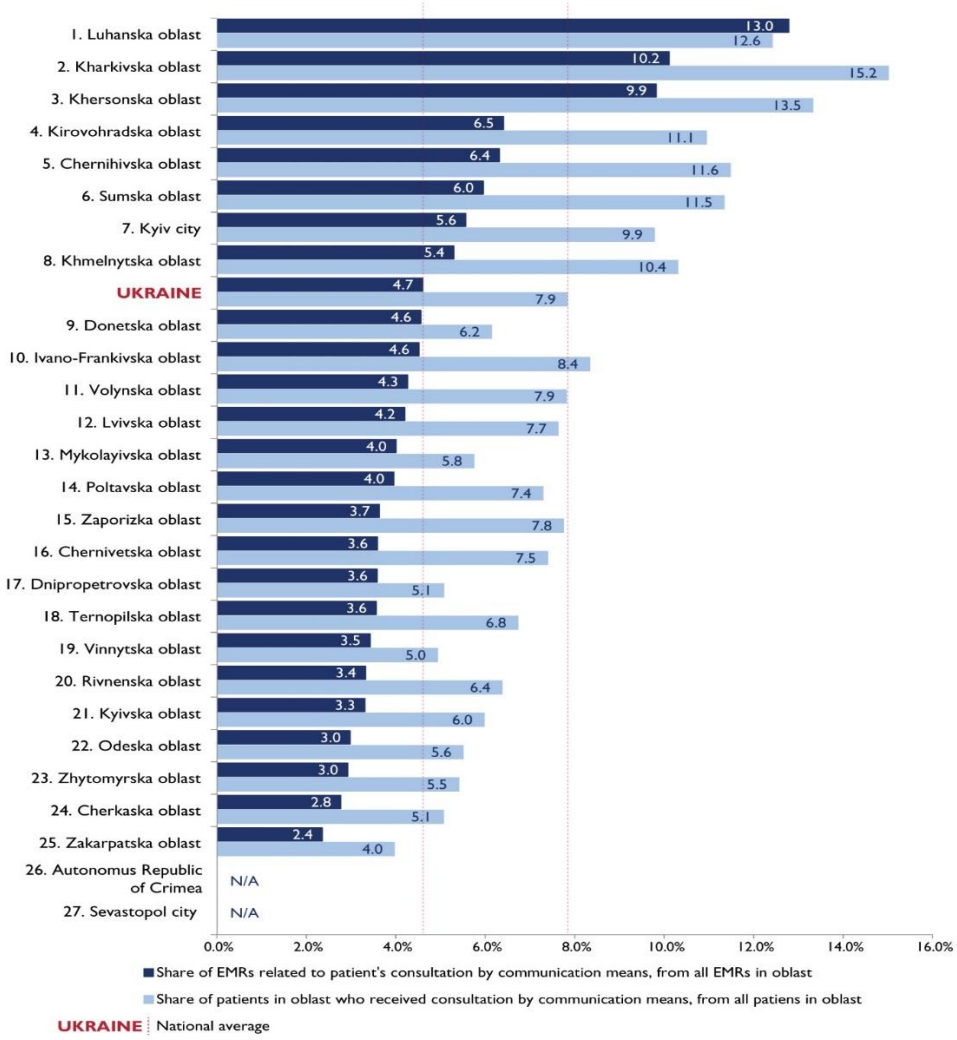
The largest share of EMRs regarding consultation by communication means (84.79 percent) compared to the same records on other classes of diseases is related to Class XXII "Codes for special purposes." This includes codes related to COVID-19, such as U04.9 Severe acute respiratory syndrome [SARS], unspecified; U07.1 COVID-19, virus identified; U07.2 COVID-19, virus not identified; U08.9 Personal history of COVID-19, unspecified etc.)[7]. To show the intensiveness of telemedicine services under this class of diseases it can be compared with number of such services under Class XXI "Factors influencing health status and contact with health services" (which includes encountering health services for examination and investigation, etc.): the number of records is almost the same under both classes (358,270 EMRs under Class XXI and 359,534 records under Class XXII mentioned above), but the share in general of all services under Class XXI is 2.86 percent (of a total 12,509,162 records under this class).

[7] See ICD-10: https://icd.who.int/browse10/2019/en#/U00-U49

## REGIONAL VARIATION

According to NHSU data, telemedicine services were provided in all regions of Ukraine. The share of telemedicine services was generally higher in regions within the active conflict zone. As Figure 6 shows, telemedicine services accounted for almost 13 percent of the total number of services in Luhansk oblast, 10.2 percent in Kharkiv oblast, and 9.9 percent in Kherson oblast. Zaporizhzhia oblast was an outlier with only 3.7 percent of services provided via telemedicine despite the region experiencing active hostilities during this period. The largest percentages of patients receiving these consultations were also from these regions: 12.6 percent in Luhansk oblast, 15.2 percent in Kharkiv oblast, and 13.5 percent in Kherson oblast. Zhytomyr, Cherkasy, and Zakarpattia oblasts have the lowest rates. The average percentage of consultations provided by communication means from the total number of services for Ukraine is 4.7 percent. Almost 8 percent of patients across Ukraine received such services.

**Figure 6. Share of consultations with communication means and of patients who received such consultations from the overall number of the consultations and patients, respectively, disaggregation by regions, January-September 2022, Percent**




*Source: NHSU data*

Ideally, a more in-depth analysis of the trends in teleconsultation use by region would be conducted using data from the previous years (2020, 2021). However, at the time of the study, such data were not available to the research team.

## TELEMEDICINE SERVICES AVAILABLE BEYOND THE PMG

Licensed health care facilities and private entrepreneurs can provide services via telemedicine outside of the PMG. As long as private health care facilities follow the wider legislation regulating the provision of medical care, they can independently define their fees, quantity, and types of services, as well as the methods of telecommunication. Unfortunately, the NHSU does not record medical services provided outside of the PMG via telemedicine, thus the data needed to analyze telemedicine service provision outside of the PMG are unavailable.

## POPULATIONS WHO USE TELEMEDICINE MOST FREQUENTLY

The study found that vulnerable groups are the main users of telemedicine. These groups both use and benefit from telemedicine the most because it facilitates their access to care, which is otherwise limited. Populations that stand to benefit most from telemedicine can be broadly broken down into two categories:

1. **War-related vulnerable groups:** Internally displaced people and people living in occupied and recently de-occupied territories.
2. **Other vulnerable groups**: People with disabilities, people living in rural areas, older adults, and people with chronic diseases, including mental health conditions.

The participants in the online survey and FGDs reported that the most active users of telemedicine services among regular vulnerable groups in 2022 were patients with chronic conditions such as cardio-vascular diseases, bronchial asthma, and diabetes mellitus as well as patients with infectious diseases. This vulnerable group consists of people who face barriers to in-person health care services most often. Barriers to access for older adults and patients with chronic diseases were exacerbated first by the COVID-19 pandemic and then by the war.

Also, participants reported war-related vulnerable groups, including internally displaced people and people living in occupied and recently de-occupied territories, also frequently used telemedicine services. Using telemedicine services could dramatically simplify their access to care, while simultaneously optimizing the limited capacities of the health care system.

Importantly, these two vulnerable groups can overlap. For example, internally displaced people could have disabilities or chronic diseases and the occupied and recently de-occupied territories also could be rural areas where access was traditionally limited. This assessment's data collection methods could not capture such intersectionality and so the need for telemedicine services could actually be greater than it measured. The study did not reveal significant differences in the level of need for telemedicine services and distinctive features of services needed among different vulnerable groups. However, health care professionals emphasize that the greatest benefits of telemedicine for patients are better continuity of health care, sustainable patient-doctor relations, and higher treatment compliance. Given these findings, personal medical monitoring devices could be an asset for particular vulnerable groups such as patients with chronic diseases, older adults, people with disabilities, and people living in rural areas.

### Barriers to access according to patients

According to patients' organizations, patients who used telemedicine services were generally satisfied with their quality. However, in some instances, the following barriers prevented or complicated patients' use of telemedicine:

1. **Lack of information about availability and eligibility**
   Patients often do not know that they can request telemedicine services and receive them free of charge, even within the PMG.
2. **Perceived lack of tools for service provision/receiving services**
   Both patients and providers stated that they often lack the means to provide/receive care via telemedicine. This stems from the notion that telemedicine services should be provided using special equipment, and regular cell phones are insufficient for that purpose. However, some of the telemedicine services, such as e-prescription and e-referral, can be readily provided without any special equipment. Additionally, audio and text consultations can be arranged via cell phone.
3. **Poor internet connection**
   Even a regular cell phone requires a stable internet connection to organize video calls and use the chatbot. This problem is particularly acute in many rural districts, where both an internet connection and mobile network coverage are lacking.

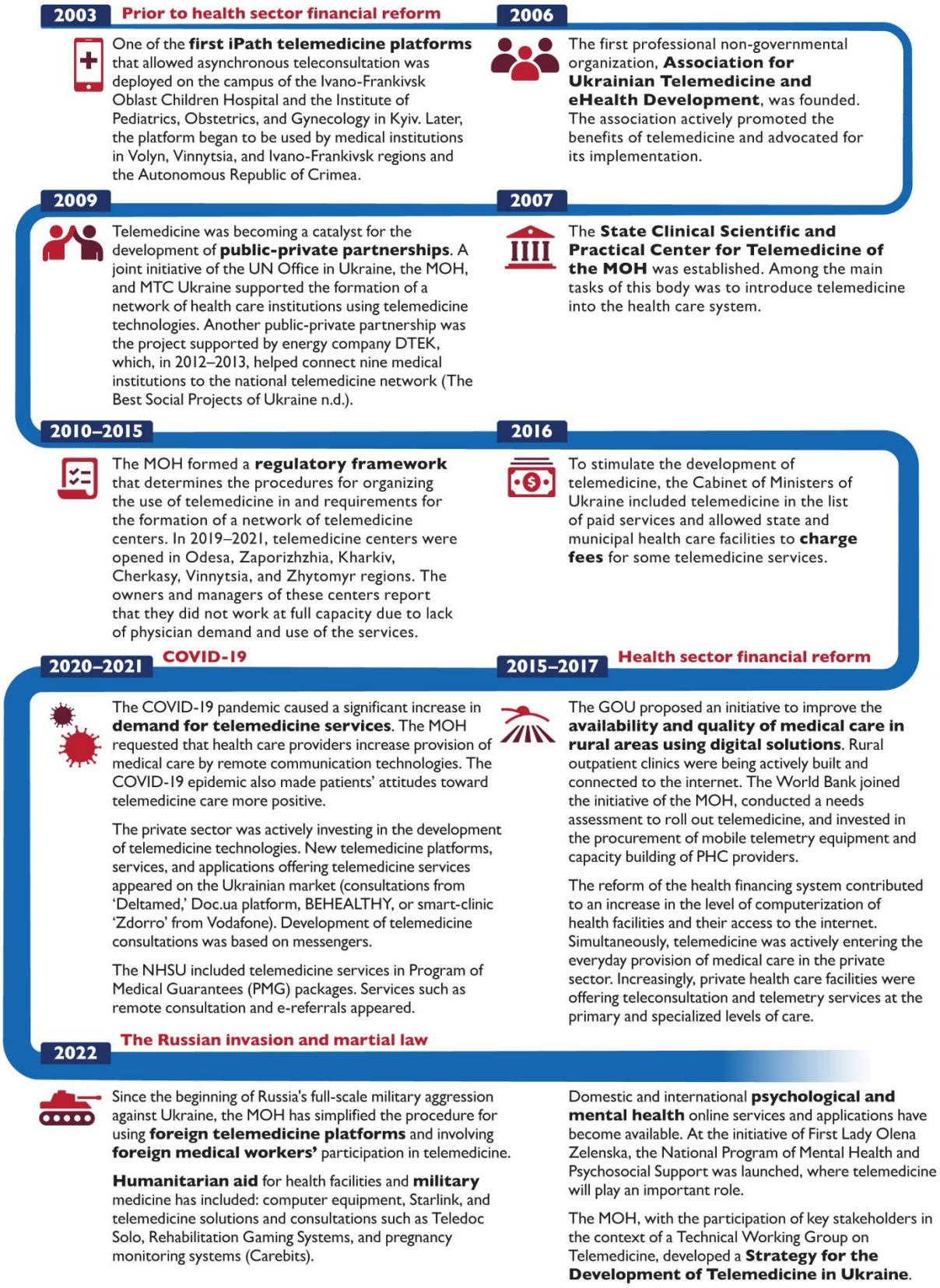
## TRENDS AND RECENT EXPERIENCES IN TELEMEDICINE USE

### MILESTONES IN TELEMEDICINE DEVELOPMENT IN UKRAINE

Figure 7 on the following page describes the development of telemedicine prior to the health sector financial reform; during the reform; at the onset of the COVID-19 pandemic; and the period of martial law.[8] [9] [10]

[8] iPath is a hybrid web- and email-based telemedicine platform developed at the University of Basel (Switzerland).
[9] MTC Ukraine was a mobile network operator in Ukraine that was rebranded into Vodafone Ukraine in 2015.
[10] Telemetry is a set of technologies that make it possible to carry out remote measurement, collection, and transmission of information about the performance indicators (physiological parameters) of the patient's body.

**Figure 7. Milestones of Telemedicine Development in Ukraine**



## RECENT HEALTH CARE PROVIDER EXPERIENCES USING TELEMEDICINE

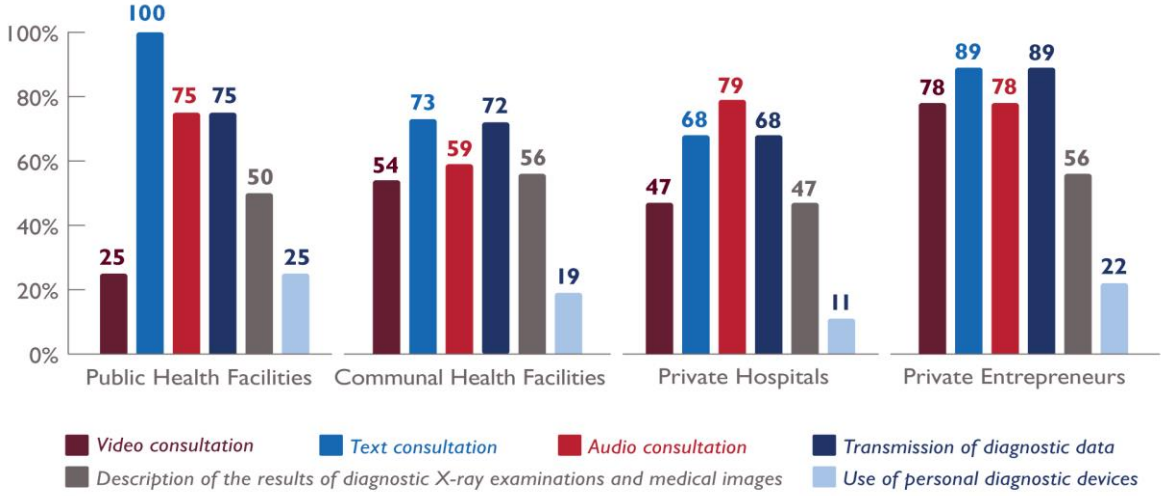
Most participants of the online survey, FGDs, and in-depth interviews had experience providing telemedicine services, and described what they provided over the past 12 months, as well as their thoughts on the relevance of such services (in particular, what drives their use, what are the obstacles to their provision, and when are they effective).

### Telemedicine services are used by most health care providers

Participants of the online survey selected which telemedicine services they provided within the past 12 months from the following list: video consultations, audio consultations, text consultations, use of personal measuring devices, transmission of diagnostic data, and description of results of X-ray and other medical imaging. The distribution of responses demonstrates that all these services had been provided in the facilities of each ownership type the respondents represented.

Most responding providers provided audio (59 percent to 79 percent depending on the ownership type) and text (68 percent to 100 percent) consultations. Video consultations were mentioned by 25 percent of state health care facility respondents; 47 percent of private facility respondents; 54 percent of communal health facility respondents; and 78 percent of private entrepreneurs. More than 70 percent of respondents indicated using telemedicine to transmit diagnostic data, and about 50 percent indicated using it to describe X-ray results and medical images (from 47 percent use by respondents working in private health care facilities to 56 percent working in communal health care facilities). For more details on the use of telemedicine in health facilities of different ownership types over the last 12 months, see Figure 8.

**Figure 8. Use of Telemedicine Methods in Health Care Facilities by Type of Ownership over the Past 12 Months**

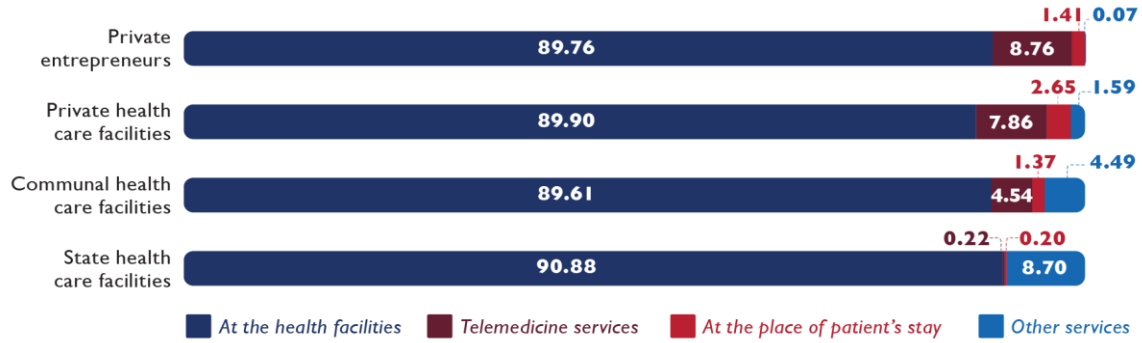



*Source: Online survey data*

Representatives of regional FGDs indicated that teleconsultations had been used most often to prescribe medications (eReceipt), conduct consultations regarding diagnostic tests results, and adjust treatment.

The NHSU data showed that private entrepreneurs and private health care facilities reported a higher share of telemedicine services utilization than did communal and state-owned health care facilities (Figure 9; see also Table 2).

**Figure 9. Places of Service Provision by Type of Health Care Facility, First Nine Months of 2022, Percent**




*Source: NHSU data*

## EXPERIENCES OF DIFFERENT REGIONS OF UKRAINE

The experience of implementing telemedicine differs substantially at the subnational level. Four of the five selected oblasts—Dnipropetrovsk, Lviv, Odesa, and Poltava—exhibit more proactive use of telemedicine compared to other regions of the country (Table 4). This was achieved by setting up telemedicine centers in public sector health care facilities and widespread use of doctor-doctor consultations. However, there are questions as to whether the success of these regions can be replicated after the war, when government resources will likely be more limited than before. The specialized telemedicine center model increases the financial and administrative burden for hospitals, which must hire additional staff to work in the centers. There also are questions about the efficacy of this approach; analysis of telemedicine services provided did not demonstrate greater usage in regions with functional telemedicine centers compared with others (see Figure 6).

**Table 4: Characteristics of Telemedicine Services in Five Oblasts of Ukraine**

| Characteristics | Odesa oblast | Poltava oblast | Kyiv oblast | Lviv oblast | Dnipropetrovsk oblast |
|---|---|---|---|---|---|
| Infrastructure | Central regional telemedicine center provides consultations mostly for PHC providers | Central telemedicine center for cardio-vascular emergencies | Telemedicine kits connected to the doctor's laptop or personal computer | Central telemedicine center for cardio-vascular emergencies | Central telemedicine cabinet in Dnipropetrovsk Oblast Clinical Hospital |
| Type of consultations | Patient-doctor and doctor-doctor | Patient-doctor and doctor-doctor | Patient-doctor | Patient-doctor and doctor-doctor | Patient-doctor and doctor-doctor |
| Specialized telemedicine trainings for medical staff | Yes<br>Organized by the Odesa Oblast Clinical Hospital | No | Yes<br>On telemedicine equipment utilization. Lack of coordination between doctors to use | No | No |
| Disease applications | Most child and adult diseases | Adult cardiology, pulmonology, and endocrinology | Adult cardiology | Adult cardiology | Different type of diseases |

The study team facilitated FGDs with health care providers from primary and specialized levels, oblast health care departments, and the NHSU interregional departments from Dnipropetrovsk, Lviv, Kyiv, Odesa, and Poltava oblasts. Participants discussed lessons learned from their experience implementing or using telemedicine methods to deliver medical services in their region. They cited the following lessons:

- **Leadership and strategic planning** are important for success. This was cited as a clear success factor in Odesa oblast, perceived the most successful region in terms of ease of use and integration of telemedicine facilitated consultations.
- **Clearly defined business processes** of telemedicine provision are crucial. Patient consent should be sought and, if possible, their inclusion in the local clinical protocols and patient's route to access telemedicine services.
- **Clear coordination of consultation between primary and specialist care**. In Poltava oblast, FGD participants found that without relevant test or screening results available at the right time, repeated appointments were needed for the specialist consultation (thus not saving as much time as otherwise). Benefits of "doctor-doctor" telemedicine would increase if timely response could be provided (such as with emergency services) and could establish multi-professional exchanges.
- **Telemedicine should be included in NHSU contracts** and, if possible and appropriate, the introduction of financial incentives for health care providers. Many providers claimed to offer telemedicine enabled care out of a sense of duty, and that they were not compensated for these sessions.
- **Sufficient investment, regulation, and infrastructure** are strong facilitators of successful telemedicine implementation. Stable internet connection and electricity supply are essential, and integration with medical information systems (MIS) would be helpful. In Odesa oblast, the oblast health care department included telemedicine into healthcare protocols for different conditions which was considered a success factor. In Kyiv oblast, doctors feel a lack of sufficient telemedicine equipment and know-how, given war time damage to infrastructure and reduced staff.

It can also be noted that Dnipropetrovsk oblast was the only region that cited a public private partnership supporting telemedicine.

## TELEMEDICINE ENABLING ENVIRONMENT

Policy directions, development partner and donor interest, and the necessity to reconnect patients to care are driving improvements in the enabling environment for telemedicine.

### POLICY AND REGULATIONS

#### (Outdated) foundational policies

The organization of medical care in primary, secondary (specialized), and tertiary (highly specialized)[11] levels with the use of telemedicine was approved by the MOH in 2015[12]. As a result, they do not account for the later introduction of financial reform or the eHealth system. The order defines requirements for subjects of medical care provision (e.g., the presence of an office, a list of necessary personnel) and describes some types of telemedicine (telemedicine consulting, telemedicine concilium, home consulting, telemetry). It is the doctor's decision whether to provide medical care by means of telemedicine.

**The Rights and Responsibilities of Medical Workers**

When providing medical care using telemedicine, the doctor has the same rights and obligations as when providing medical care in the traditional way

The same order requires that standard clinical protocols and standards of medical care, approved by orders of the MOH, are used during telemedicine consulting (Verkhovna Rada of Ukraine 2015). However, the legislation does not define the procedures and clinical protocols to be applied to other types of telemedicine, such as remote conducting medical procedures and operations.

The use of modern technologies for medical care in rural areas was legislated in 2017, specifically telemedicine[13]. It establishes the procedure and criteria for providing state-sponsored health services in rural areas with modern telecommunication technologies (Verkhovna Rada of Ukraine 2017). Almost simultaneously, amendments were made to update the basic law of Ukraine in the field of health care, "Fundamentals of the legislation of the health care of Ukraine," which defines telemedicine as "*a set of actions, technologies and measures used in the provision* of medical care employing *remote communication means for the exchange of information in electronic form"* (Verkhovna Rada of Ukraine 1993). The same law also defines the subjects of medical care using telemedicine as "*health care facilities and individual entrepreneurs who are registered and have received, in accordance with the procedure established by law, a license to conduct economic activities in medical practice."*

[11] According to Article 33 of the current version of the Law of Ukraine "Fundamentals of the legislation of the healthcare of Ukraine," medical care is divided into the following types: emergency, primary, specialized, palliative (Verkhovna Rada of Ukraine 1993).
[12] Order of the Ministry of Health No. 681 of January 19, 2015 "On approval of regulatory documents on the use of telemedicine in the field of health care"
[13] "On Improving the Availability and Quality of Medical Care in Rural Areas" (Verkhovna Rada of Ukraine 2017)

### Patient information and consent

Provision of telemedicine services involves the collection, transmission, use, and storage of a patient's personal data. The Law of Ukraine "On Protection of Personal Data" establishes basic requirements for the collection, storage, and processing of personal data of patients when using telemedicine. A MOH 2020 order establishes general rules regarding the terms of processing and storage of personal data and other information obtained during treatment, which are contained in the Register of Medical Records.[14]

The provision of medical care, including with the use of telemedicine, involves obtaining the informed voluntary consent of the patient.[15] A form indicating informed voluntary consent must be filled out by the patient in the presence of the attending physician and certified by the signatures of the attending physician and the patient or their legal representative (Verkhovna Rada of Ukraine 2012). That is, the procedure requires the physical presence of the patient in a health care institution and does not permit obtaining consent remotely. In this assessment, 88 of 128 (69 percent) respondents to the online survey reported that they are not aware of the existence of an informed consent procedure for telemedicine services.

### Regulation of technical standards

A 2018 resolution established the requirements for the eHealth database and the Technical Requirements for MIS, which are approved by the NHSU for the need to expand the functionality of the eHealth for users (National Health Service of Ukraine 2022).[16] The compliance of MISs with these requirements is checked by the Administrator of eHealth in accordance with the Test Program of Compliance of Electronic Medical Information Systems with Technical Requirements, which is also approved by the NHSU (National Health Service of Ukraine 2022).

### Strategy and policy developments since February 2022

In 2022, the MOH in cooperation with key stakeholders prepared a draft strategy for the development of telemedicine in Ukraine in accordance with the Order of the MOH "On the Interdepartmental Working Group on the Development of the Concept of Telemedicine Implementation" of February 11, 2022, No. 281 (Verkhovna Rada of Ukraine 2022). The draft strategy identifies priorities for the development of telemedicine:

- Ensuring the availability of telemedicine services through eHealth and other information and communication systems, mobile applications, and specialized telemedicine solutions
- Expanding patients' access to their own medical information

[14] The Order of the Ministry of Health No. 587 of February 28, 2020 "Some Issues of Maintaining the Register of Medical Records, Referral Records and Prescriptions in the Electronic Health Care System," indicates medical care using technical means of electronic communications as one of the ways to provide medical care and defines rules regarding the terms of processing and storage of personal data and other information obtained during treatment, contained in the Register (Verkhovna Rada of Ukraine 2020).

[15] The Order of the Ministry of Health No. 110 of February 14, 2012, "On approval of forms of primary accounting documentation and instructions for their completion, used in health care institutions, regardless of the form of ownership and subordination," approved form No. 003-6/o "Informed voluntary consent of the patient to diagnose, treat and to perform surgery and anesthesia and to the presence or engagement of participants of the educational process."

[16] Resolution of the Cabinet of Ministers of Ukraine dated April 25, 2018, No. 411 "On Some Issues of the Electronic Health Care System."

- Allowing patient-initiated telemedicine interaction with a doctor
- Ensuring the interoperability of the patient's medical data, regardless of the technological solutions used for their accumulation and the place of data storage
- Ensuring the proper quality and safety of telemedicine
- Improving the regulatory framework
- Popularizing telemedicine through media, awareness-raising campaigns, and other means

Following the full scale Russian invasion, the implementing context changed dramatically. Under martial law, medical workers and rehabilitation specialists who are not Ukrainian citizens, subject to their registration in the information and communication systems, are permitted to provide medical and rehabilitation assistance using telemedicine.[17]

## FINANCING TELEMEDICINE

### How health care services are financed

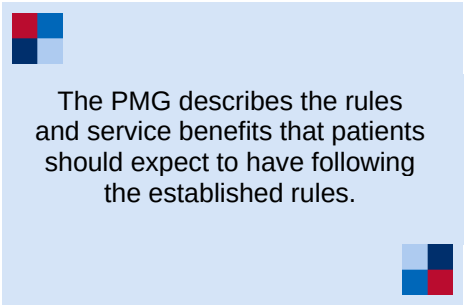
To understand how telemedicine is paid for and could be paid for in the future, it is important to consider how all health services are financed. The ongoing comprehensive health reform framework is outlined in several government documents, including the Health Financing Reform Concept, the Law on State Financial Guarantees for Medical Care for the Population and the related by-laws (Verkhovna Rada 2017).[18] The Law created a legal basis for: (i) development of a PMG to be funded through general taxes pooled at the national level, to ensure clarity in the entitlements and obligations of citizens; (ii) introduction of new financial mechanisms and payment methods, to ensure a more efficient and equitable use of resources; (iii) establishment of the NHSU as a single purchaser that is responsible for the implementation of PMG and that contracts communal and private providers to deliver the PMG (Verkhovna Rada of Ukraine 2017). This paved the way for government funding to "follow the patient," direct resources to priority services, increase efficiency, and reduce patients' financial risk and barriers to accessing care.

- Most health care providers and patients had little understanding about the financing of telemedicine infrastructure and services.
- Neither patients nor health care providers were aware that telemedicine services are included in PMG service packages and, therefore are covered by tariffs set for the respective packages
- Patients were not always sure whether they could receive telemedicine services as part of PMG.
- Most specialists thought there should be a separate "telemedicine" package.

[17] Telemedicine issues under martial law are regulated by the Orders of the Ministry of Health dated June 20, 2022, No. 1062 "On the organization of medical care using telemedicine under martial law" and September 17, 2022, No. 1695 "On approval of the Procedure for the provision of medical care using telemedicine, rehabilitation assistance using telerehabilitation for the period of martial law in Ukraine or its individual areas."
[18] Cabinet of Ministers' Decree as of November30, 2016, Lawof Ukraine as of October 19, 2017 # 2168-VIII "On State Financial Guarantees for Medical Care of the Population" .

## General rules of purchasing services covered by the PMG

The PMG is presented as a catalogue of “Service Packages,” that patients may access for no cost and for which health care facility receives payment according to a contract with the NHSU The number of service packages varies every year, from 25 in 2020 to 41 in 2023. Each service package corresponds with (i) a payment mechanism, and (ii) specific requirements for service organization and provision (known as “*vymohy*”), which are the criteria against which a contract is awarded and monitored. Any eligible health care facility (public or private incl. private entrepreneurs) can sign a contract with the NHSU. For each service package, the NHSU develops a provider payment mechanism and sets a payment rate (tariff) within the approved PMG budget pool for each year:




- The main payment mechanisms are capitation, global budget, and case-based/ diagnosis-related group (DRG); these systems can be adjusted by different factors (age, geography, and specific conditions, services, and performance).
- Payment rates (tariffs) are set annually within the overall PMG budget, and cover the cost of wages and salaries, food in hospitals, medicines, and other costs except for utilities and capital expenditures that are covered by local governments.

## Financing of telemedicine services under the PMG

Many PMG service packages allow or require the use of telemedicine for service provision. These telemedicine services are part of the relevant service packages. They are therefore covered under the payment mechanism established for that package and are not reimbursed separately or in addition to the payment for that service package. For example, consultations via telecommunication are allowed in PHC service packages, so a PHC provider can decide which type of consultation, in-person or via telecommunication, to use in each case. These decisions may affect the provider’s workflow, but not the amount the provider receives from the NHSU.

The 2023 PMG (as of January 2023) includes 41 service packages, 10 of which allow or require the use of telemedicine for service provision and have direct wording referring to “telemedicine consultation using telecommunication means,” and “video-DOT”; another six packages (21, 22, 23, 24, 27, and 31) mention photo recording, video recording, and digital media (which can be used for remote transmission, if needed). See Table 5 for a list of service packages referencing telemedicine. Even for these packages there is a lack of standard terminology and requirements to outline telemedicine service provision: different packages use different language to describe teleconsultations. This results in an inconsistent approach to incorporating telemedicine into the PMG. For example, teleconsultation is allowed for TB treatment at the PHC level, but not for HIV treatment at that level. Similarly, teleconsultation is allowed for the palliative mobile team but not for the psychiatric mobile team. Telemetry is not mentioned in any package. However, transmission of diagnostic data stored in digital format may occur if appropriate technical capabilities are available.

**Table 5: 2023 PMG Service Packages that Refer to Telemedicine**

| Service package | | Reference to telemedicine | Payment mechanism for service package |
|---|---|---|---|
| **#1** | Emergency medical care | Includes 24/7 consulting of ambulance teams by the dispatcher using information and communication technologies and/or telemedicine tools; transfer of all operational information online and provision of information about available resources of the ambulance network; patient data input and transfer to the electronic system of medical information and analysis. | Global budget based on population coverage |
| **#2** | PHC | May provide services using telecommunication at doctor's discretion. The PHC package also allows the organization of a hotline to answer the most common questions regarding the provision of PHC, including COVID-19 issues. | Risk-adjusted capitation based on number of enrolled population (declarations) |
| **#3** | Outpatient prenatal care | The use of telemedicine, SMS, telephone, etc. is allowed only in cases of COVID-19 acute respiratory disease. | Capitation per pregnant woman per month |
| **#5** | Inpatient and outpatient treatment of adults and children with TB | Includes the organization of controlled administration of anti-tuberculosis drugs to patients during the inpatient and/or outpatient stages of treatment, including through the use of digital technologies. | Capitation per (base rate per year for readiness to treat one person) |
| **#8**<br>**# 9** | Acute myocardial infarction (inpatient)<br>Acute cerebral stroke (inpatient) | May conduct urgent telemedical consultations with doctors of other specialties. | Case-based / DRGs |
| **#10** | Mobile palliative care for adults and children | Palliative mobile team can use telecommunication round-the-clock, at the same time, the minimum number of interactions by means of telecommunications is at least 1 time per week, with making a corresponding record in eHealth. | Global budget |
| **#15** | Inpatient palliative care for adults and children | May provide consultations using telecommunication by specialists of the palliative service for doctors of other specialties who work in departments/health centers where palliative patients receive treatment. | Global budget/DRGs |
| **#17** | Support and treatment of adults and children with tuberculosis (TB) at the PHC level | May provide services using telemedicine which involves collaboration with patients regarding an outpatient model of treatment under the supervision (video-DOT, DOT at the place of service, DOT at home, etc.). | Capitation/per TB patient for outpatient treatment; adjustments related treatment result |
| **#30** | Medical rehabilitation of infants born prematurely and/ or sick during the first three years of life | Provides early intervention services to families at their location and/or through the use of telecommunications. | Global budget |
| **#21**<br>**#22**<br>**#23**<br>**#24**<br>**#27**<br>**#31** | Bronchoscopy<br>Hysteroscopy<br>Esophagogastroduodenoscopy<br>Colonoscopy<br>Mammography<br>Cystoscopy | Required to ensure photo recording (a minimum number of images is defined for each package; with storage of images in the medical documentation) and/or complete video recording of the entire procedure with storage of digital photos/video materials for 2 years. All these packages also provide the option to record the results of the study on the patients' digital media (can be transmitted if needed). | Fee for service |

### Financing of telemedicine services outside of the PMG

Patients pay for services ordinarily covered by the PMG if they bypass referrals, just as they pay for services outside of the PMG; some of these services include telemedicine. Patients also pay for any services received directly from private providers not contracted by the NHSU. Indirectly, patients pay for services within private insurance coverage networks and for the services received as bonuses by the clients of certain banks, of mobile operators, and others. The Council of Ministers of the Autonomous Republic of Crimea, oblast state administrations, and both Kyiv and Sevastopol city state administrations have set tariffs for all services for which a fee can be charged based on these criteria. Outside of the PMG, state and communal health care facilities may collect a fee for providing the following health care services *via telemedicine* (Verkhovna Rada 1996):[19]

- Laboratory, diagnostic, and advisory services at the request of citizens, provided without a doctor's referral
- Medical assistance to patients at home (diagnostic examination, procedures, manipulations, counseling, care)
- Medical care under contracts with business entities and insurance organizations
- Medical care of foreign citizens temporarily staying in the territory of Ukraine, including under insurance contracts

## TELEMEDICINE STAKEHOLDERS IN UKRAINE

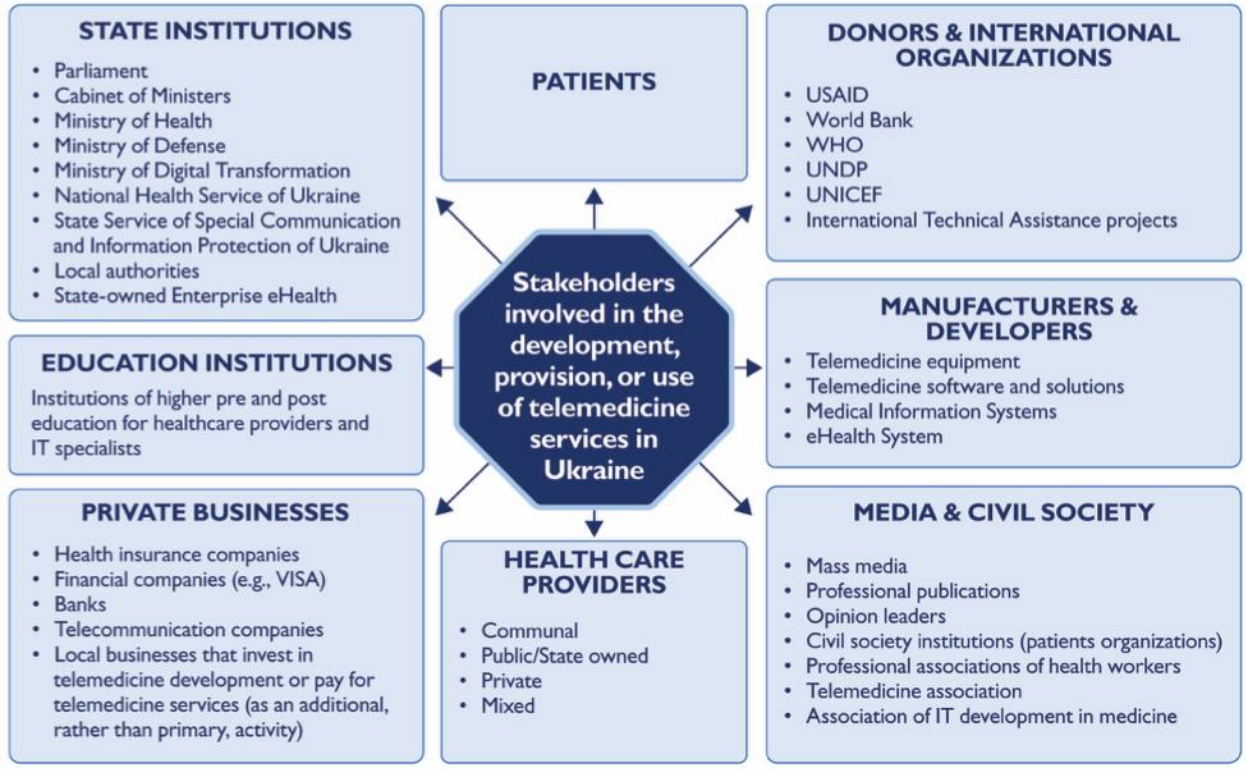
The landscape assessment team identified the following categories of stakeholders (Figure 10 provides a more complete list of the stakeholders in each category):

- **State institutions:** state authorities, state executive bodies, and state enterprises according to their organizational and legal form.
- **Health care providers:** public, communal, private, or mixed ownership and health workers (including doctors).
- **Educational institutions:** pre- and post-education institutions for health care providers and information technology (IT) specialists.
- **Influencers and media:** stakeholders who are important for communication and conveying information to users and implementers of telemedicine. Representatives of this category are rarely involved in the practical implementation of decisions but theyare considered essential in communicating such decisions.
- **Manufacturers and developers:** developers and providers of telemedicine equipment, software, and solutions (medical information systems (MISs) and eHealth System).
- **Donors and international organizations including technical assistance projects:** such entities that financially or technically support telemedicine development in Ukraine.

[19] Cabinet of Ministers Decree No. 1138 from September 17, 1996, "On Approval of The List of Paid Services Provided in State and Communal Health Care Institutions and Higher Medical Educational Institutions"

- **Private businesses**: health insurance companies, financial companies (such as VISA), banks, and local businesses that invest in telemedicine development or pay for telemedicine services (as an additional, rather than primary, activity).
- **Patients:** citizens of Ukraine who use telemedicine services.

**Figure 10. Map of Stakeholders Involved in the Development, Provision or Use of Telemedicine Services in Ukraine**




See Annexes B and C for a detailed overview of stakeholder responsibilities in: formulating policies and regulations, lobbying, providing telemedicine services, paying for telemedicine services, investing in infrastructure and telemedicine solutions, building capacity of health providers, and promoting telemedicine services.

On first glance, stakeholder functions seem to overlap, making it appear that some functions are redundant. However, analysis of normative acts regulating the responsibilities of authorities showed that each stakeholder at its level and within its power implements its assigned functions and powers. As a result, there is little to no overlap between roles as each stakeholder implements their functions at different levels. For example, the Law of Ukraine “On the Cabinet of Ministers of Ukraine” states that the Cabinet of Ministers ensures the implementation of state policy in the field of health care, care for pregnancy and childbirth and childhood, and the availability of medical facilities for citizens (Verkhovna Rada of Ukraine 2014). The Regulation on the MOH, approved by Cabinet of Ministers Resolution No. 267 dated March 15, 2015, empowers that ministry to organize the provision of medical care, including the use of telemedicine (Verkhovna Rada of Ukraine 2015).

The MOH and the SOE eHealth have direct responsibility for the development and implementation of telemedicine, information, and information -telecommunication systems for the health care system in Ukraine. The MOH is also responsible for strategic planning and

coordination of stakeholder efforts aimed to support telemedicine development in Ukraine. Recent health reforms have devolved ownership of health facilities, and responsibilities for capital and equipment investments to community and local governments, and allow greater participation of private health care facilities in state-financed health care provision. Subnational governments and other state institutions are responsible for the organization and provision of (i) medical care in specific territorial communities or for certain population groups or (ii) infrastructure or (iii) telecommunication solutions. Despite the fact that the MOH is responsible for organizing medical care and providing medical services, including the use of telemedicine, and the NHSU is the payer for PMG services, local authorities have a primary role in the organization of medical care at the local and service delivery/facility levels, especially its restoration in the de-occupied territories.

This assessment found that monitoring of telemedicine services is not assigned to any stakeholder. The NHSU has the potential to perform this function as it collects data on health services, including telemedicine, from the contracted health providers.

Often, crisis situations such as pandemic or war stimulate interest in telemedicine among domestic stakeholders. International development partners and businesses have high interest in telemedicine and, in fact, high influence, as they contribute to the financing of essential equipment, solutions, and training, as well as technical assistance and policy advisory. Influence and interest are rather dynamic categories, especially in times of crisis. Development partners such as USAID have an important role in the development of telemedicine in Ukraine. Acting through international technical assistance projects, USAID supports the implementation of solutions, procurement of equipment, communication, and education.[20] [21]

## HEALTH CARE PROVIDER READINESS

The study sought information about the presence/absence of appropriate training, technical tools, provision of services, procurement of telemedicine equipment, and other telemedicine infrastructure. Participants in the online survey, FGDs, and in-depth interviews shared their views on the obstacles and prerequisites for the development of telemedicine services.

### Trainings received and required by health care providers

One of the preconditions to a provider's use of telemedicine services is the provider having the knowledge and skills to use the services in accordance with the technical features of equipment, protocols on health care provision, personal data protection, work with the MIS, and so forth. Eighty-three percent of survey respondents indicated that they had not been trained to provide telemedicine services. Others reported that they had received training on telemedicine-related topics organized by different providers (governmental and non-governmental):

- On telemedicine in general, its use in clinical practice (organized by the Medical Academy of Postgraduate Education, as well as the Health Care Department)
- On the use of MISs (organized by MIS manufacturers)

[20] For more information see https://medplatforma.com.ua/news/2943-telefonne-konsultuvannya-rekomendats-lkaryam
[21] See also https://m.facebook.com/groups/btmo.com.ua/permalink/849511788940707/

- On the use of specific types of telemedicine equipment, online consultation platforms (organized by manufacturers/distributors of respective equipment, as well as the Health Care Department)
- On providing consultations by phone (organized by USAID)
- On personal data protection (organized by the NHSU)

The survey participants mentioned an urgent need for training: 66 percent of respondents believe their knowledge of telemedicine to be insufficient; 43.8 percent of respondents indicated that if they had the opportunity to study telemedicine, they would choose all seven of the topics included in the study. The training topics proposed by the researchers include i) reporting on telemedicine services in the e-Health system and other electronic systems, ii) criteria for using telemedicine services, iii) clinical aspects of telemedicine services, iv) user's guide for each type of telemedicine services, v) cooperation between health care providers and telemedicine equipment providers, vi) patient pathway, and vii) regulation of telemedicine services in Ukraine. The request for training on different topics ranged from 68 percent to 88 percent.

### Use of equipment for provision of telemedicine services

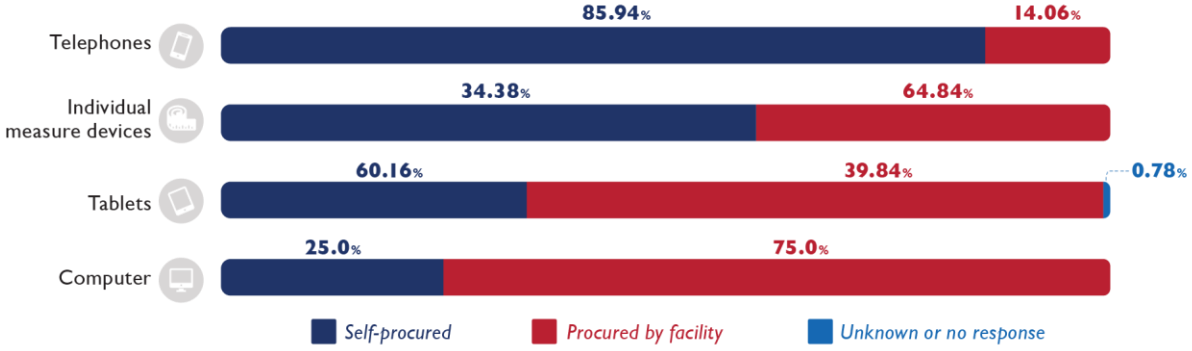
The largest share of telemedicine equipment used by the online survey participants for providing telemedicine services is accounted for communication devices—mobile phones (95 responses), computers (44 responses), and laptops (20 responses); fewer (9) respondents mentioned tablets, most likely because they are more convenient for mobile work (e.g., emergency teams are equipped with tablets), while in the office, computers and laptops are more convenient.

Among the specialized equipment used to diagnose and monitor a patient's condition was a pulse oximeter, glucometer, spirometer, thermometer, dermatoscope (with remote data transmission), electrocardiograph (also with remote data transmission), fetal monitor, X-ray diagnostic complex IMAX, as well as a *Tyto Care* telemetry device, IDIS portable telemedicine complex, and *Unet* telemetry cardiology complex.

Participants of the in-depth interviews also mentioned that telemedicine services are provided using appropriate software, messengers, and special telemedicine platforms integrated into the relevant MIS used by health facilities. Medair, Teladoc, Telekard, and Montex are the telemedicine platforms used by doctors during their work. Data are stored on health facilities' servers, while area servers are used much less often.

The online survey participants (N=128) reported that they purchased or used their own equipment by themselves to provide telemedicine services: mobile phones (85.94 percent of respondents), tablets (60.16 percent of respondents), individual measuring devices (34.38 percent of respondents), and computers (25.0 percent of respondents), while health facilities where they work also provided computers (75.0 percent of respondents), individual measuring devices (64.84 percent of respondents), tablets (39,84 percent of respondents), and telephones (14.06 percent of respondents) (see Figure 11).

**Figure 11. Sources for Procurement of Equipment for Telemedicine Services, online survey data, Percent**




The responses indicate that more than half of the respondents—65 out of 128 (51 percent)—independently purchased or used their own equipment to provide telemedicine services, which may further suggest that insufficient material and technical support will hinder the further development of telemedicine.

## Barriers to telemedicine service provision mentioned by health care providers

Health care professionals stated that their readiness to provide care via telemedicine was hampered by a range of obstacles. Eliminating these barriers might increase the readiness of health care providers to use/implement telemedicine in clinical practice. The obstacles mentioned by the health care professionals and revealed by the desk review are the following:

### Policy and regulatory obstacles:

- National regulation of telemedicine is considered by health professionals as rigid and outdated, in particular as it is related to organization of telemedicine cabinets and the requirement to double-record telemedicine services in paper format.
- Regulation lacks clear definitions of health professionals' roles and responsibilities, so they do not feel safe providing telemedicine services.
- Patient's informed consent is required in paper format even for telemedicine services.

### Information and organizational obstacles:

- Lack of information about telemedicine governance and financing: Health care providers are often unsure about division of responsibilities among government institutions as well as financing when it comes to telemedicine services and telemedicine equipment.
- Lack of clear algorithms on telemedicine utilization in most regions and facilities (in the form of clinical protocols, patient routes, business processes).

### Financial obstacles:

- Fragmented financing of telemedicine infrastructure does not cover all the needs in equipment and software to provide the variety of telemedicine services.
- Unclear financial incentives for providers: Many health professionals believe they lack financial incentives to provide the telemedicine services, which seems to be the result of information and human resource obstacles.

### Human resource obstacles:

- Reductions in human resources (especially in rural areas and in the front-line territories) increase the burden on health professionals, which results in lack of time for telemedicine services provision.
- Lack of knowledge and skills: The majority of interviewed medical workers reported that they had not received training on telemedicine devices, and that they lacked knowledge and skills necessary to provide services via telemedicine.
- Telemedicine is not included into health care professionals' job description, resulting in some considering it unregulated and an additional burden.
- Lack of technical personnel results in specialized telemedical equipment not being used to provide care as it needs to be set up, adjusted, and constantly supported by technicians.

### Infrastructure obstacles:

- Poor internet connection (interruptions, low speed, etc.) inhibits the use of telemedicine; this problem is more acute for respondents who work in rural areas (in urban areas, respondents recognized the situation as somewhat better). In some cases, a weak mobile network signal is also an obstacle.
- Lack of specialized equipment for telemedicine service provision.
- Lack of interoperability between telemedicine equipment and MISs installed in health care facilities impedes the results of telemedical service from being transmitted for further processing by a doctor.
- Lack of compatibility between different MIS installed in different health care facilities, which makes it impossible for many doctors to exchange data via MIS.

The study showed that health care professionals' readiness to use telemedicine is negatively impacted by the obstacles above; thus, the main opportunities lie in the elimination of these obstacles. At the same time, crises create space for stimulating interest and out-of-the-box solutions. The experience of health care providers in telemedicine utilization during this crisis should be further supported and promoted.

## Health care providers' attitudes toward telemedicine

According to most survey participants, the most important factors increasing demand for telemedical services were initially the COVID-19 pandemic and then the outbreak of full-scale war. Although the adoption of telemedicine was to a large degree a forced step, survey respondents recognized its potential use in their everyday medical practice.

Respondents felt that telemedicine is an important tool that facilitates patients' access to health services, and therefore it should be further developed. Specifically:

- Telemedicine has been extremely important for ambulance staff because, as one respondent stated, it is *"a shield that covers you from dangerous situations."*
- Telemedicine has helped health professionals receive a second opinion in difficult cardiology cases.
- Telemedicine has been very effective in emergency medical care, as it facilitates diagnostics of complicated cases and provides an opportunity to receive expert opinion from the colleagues remotely.

- A sufficiently organized telemedicine infrastructure (call center, software, telemedicine equipment) and appropriate organization of employment for doctors who provide only telemedicine consultations are important to successful implementation of telemedicine.
- Telemedicine was helpful during the height of the COVID-19 pandemic as it enabled provision of remote medical care to people with COVID-19, pregnant women, and those with chronic conditions who could not reach hospitals due to COVID-19 restrictions.
- Telemedicine has connected doctors from primary and specialized health care, enabling them to provide complex medical services to patients, which ultimately increased the patients' satisfaction with medical care.
- Doctors learned more from their colleagues who are experts in their field of medicine. This increased their level of confidence because they now can receive help from colleagues easily.

Health care professionals' newfound awareness of the importance and benefits of telemedicine has made them more open to using telemedicine technologies in their daily medical practice.

## TELEMEDICINE INFRASTRUCTURE

The study examined two aspects of infrastructure for telemedicine – technical components and the standards and requirements of the various platforms. Finally, there is discussion of financing of infrastructure for telemedicine.

### TECHNICAL COMPONENTS

Technical requirements for telemedicine to be operational today rely on a number of technical devices and applications, namely: computerized health facilities such as (i) automated workstations (computers, tablets, multimedia, etc.), (ii) mobile communication devices (phones, smartphones, etc.) and video/audio communication software; access to communication networks and the internet; stationary and mobile equipment for telemetry and teleradiology; data centers and server equipment for information storage; software and telemedicine platforms, including MIS.

#### Computerization of health care facilities (personal computers, cameras, microphones)

Computer equipment is a basic and integral part of telemedicine communications. Health care financing reform has encouraged institutions and their owners (local authorities) to computerize their facilities and services at a widespread and fairly rapid pace. As a result, as of 2019, 70 percent of specialized health care facilities and 97 percent of PHC facilities in Ukraine have been computerized (TSN 2019). According to a World Bank study conducted in 2019 in five regions of Ukraine, 94 percent of doctors have a personal computer at their workplace, and 90 percent have access to the internet from their workplace computer all or most of the time (Ustynov 2019). Representatives of patient communities who participated in the study reported that lack of access to the necessary technologies for remote medical care, software, and appropriate computer equipment remains an obstacle to receiving medical services via telemedicine. There is also a belief among the patient community that outdated models of mobile phones cannot be used to receive telemedical services.

#### Access to the internet and mobile connection

Communication networks enable teleconsultation, that is, the transmission of medical information. In 2019, there were more than 50 million mobile subscribers in Ukraine, which has

a population of about 42 million (NV 2020); 74 percent of the population age 12-70 used the internet, 85 percent of them daily. At the same time, 23 percent of Ukrainian citizens living in villages and towns did not have access to the internet (Government Portal 2021). Regular attacks by the Russian army on critical infrastructure have caused interruptions in stable and high-speed internet and mobile communications in various regions of Ukraine. To solve the problem of internet access, Ukraine had received more than 30 thousand Starlink terminals from foreign partners as of mid-January 2023 (Minfin 2023), which have proven to be helpful in maintaining internet access.

### Stationary and mobile equipment for telemetry and teleradiology

Before the beginning of the full-scale war, more than 4,000 mobile diagnostic kits were purchased at the expense of the state, local budgets, and donor assistance (Ministry for Communities and Territories Development of Ukraine n.d.) including Beecardia mobile telemetry kits, IDIS mobile diagnostic kits, UNET (UTAS) telemedicine cardiology kits, TMDN-Tredex software and hardware kits for telemetry and telemedicine consultation, and digital 12-channel ECG systems Telecard. Analysis of the use of these kits identified problems with standardization of information for the exchange and transmission of medical diagnostics. Furthermore, the devices do not have the ability to interact directly with the central eHealth database, only indirectly, through MISs (in some cases).

Before the beginning of the full-scale war, a variety of diagnostic equipment necessary for the service provision under PMG was available in health care facilities contracted by the NHSU: X-ray machines, computer tomographs (CT scanners), magnetic resonance imaging, ultrasound machines, and endoscopic machines. This electronic equipment can be used for telemedicine, in particular for remote data access and transmission. However, there is currently no information about equipment that has a digital interface (the ability to transmit digital images). Also, currently no information is available regarding the availability and operation of mentioned telemetry and diagnostic equipment in the facilities.

### Data centers and server equipment for diagnostic data storage

To preserve medical information, data centers were built in some regions[22] before full-scale war began, and server equipment was installed in medical facilities. Due to the hostilities, many institutions moved their data—some to other, more peaceful regions of the country, some to the cloud in Ukraine, and others to the cloud abroad. The State Service for Special Communications and Information Protection of Ukraine has made appropriate changes to the legislation that allowed even government agencies to use cloud technologies (Government Portal 2022). Since February 2022, during the period of martial law, the Cabinet of Ministers of Ukraine has allowed the storage of eHealth data within foreign clouds. However, the research did not find evidence of widespread use by medical facilities, institutions, telemedicine equipment providers or medical software providers of a cloud solution (such as AWS, Google cloud, Microsoft Drive, etc.) to thus ensure reliable storage, protection, and security of information.

### Software and telemedicine platforms

Of 32 MISs connected to the central eHealth database and used by primary and specialized health care facilities, only 8 have online consultation functionality (see Annex A). There are also

[22] These oblasts are Dnipropetrovsk, Kharkiv, Kherson, Kyiv, Odesa, Poltava, Rivne, Ternopil, and Vinnytsia.

private telemedicine platforms/systems that provide remote medical patient-doctor and doctor-doctor(s) teleconsultation services in synchronous and asynchronous formats throughout Ukraine. Unfortunately, telemedicine platforms and solutions available on the market often do not contain functions that allow people with visual and hearing impairments to use telemedicine services. During the war, international donors provided humanitarian aid in the form of telemedicine platforms (TelaDoc, Rehabilitation Gaming System, Carebits, Epiqar, HomeDoctor). However, they function separately and are not integrated with MISs and the central eHealth database.

## STANDARDS AND REQUIREMENTS

### Current standards used in Ukraine

The eHealth system is built on open-source software according to HL7 FHIR standards and according to certain specifications. Open access information on MISs includes the data model, connections between system entities, business processes, a description of technical requirements and validations, the guides used, and informational materials about the developed functionality (eHealth n.d.).

In Ukraine, encryption is used to protect the exchange of medical data between systems and between the central eHealth database and an MIS. The law “On personal data protection” defines the basic requirements for the processing of personal data, including those used for health protection purposes (Verkhovna Rada of Ukraine 2010). To ensure the protection of information Ukraine has the Comprehensive System of Information Protection. This certification is obligatory and received by the eHealth system and the MISs that interact with it.[23]

### Standard aspirations

To support the European integration processes, the main technical requirements for telemedicine equipment is the European Union Medical Devices Regulation 2017 (EU 2017/745), which took effect on May 26, 2021. Ukraine has not yet aligned its technical requirements for medical equipment with the requirements of this EU Regulation and continues to use the technical requirements for medical equipment established in DSTU EN 60601-1:2015 "Electrical products for medical purposes" which are based on the previous Directives of the EU Council from June 14, 1993, 93/42/EEC.

For Ukraine, it is also important to adopt and expand on existing use of international standards for compatibility, exchange, storage, and use of medical information to ensure that the relevant hardware and software tools transmit medical information promptly, efficiently, and securely. The following international standards are proposed for full adoption and implementation:

- HL7 FHIR (Fast Healthcare Interoperability Resources, https://hl7.org/fhir/) standard for health care data exchange – adopted for eHealth but not yet fully integrated

[23] For more information, see the State Service of Special Communications and Information Protection of Ukraine: https://cip.gov.ua/ua/news/zasobi-tzi-yaki-mayut-ekspertnii-visnovok-pro-vidpovidnist-do-vimog-tekhnichnogo-zakhistu-informaciyi; *Electronic Health Care Security*, SOE eHealth: https://ehealth.gov.ua/2022/07/19/bezpeka-elektronnoyi-systemy-ohorony-zdorov-ya/; and *Medical Information Systems Disconnection*, SOE eHealth: https://ehealth.gov.ua/2022/06/02/vidklyuchennya-mis-vid-tsbd-esoz-cherez-vidsutnist-atestatu-vidpovidnosti-kszi/.

- OpenEHR (Open Electronic Health Record, https://www.openehr.org/) - standard for managing, storing, and sharing electronic medical records
- ISO/IEC 27001 is the world known standard for information security management systems (ISMS) and their requirements
- European Union (EU) GDPR (General Data Protection Regulation, https://gdpr-info.eu/). The European Data Protection Regulation is applicable as of May 25, 2018, in all member states to harmonize data privacy laws across Europe
- DICOM (Digital Imaging and Communications in Medicine, https://www.dicomstandard.org/) – standard for creation, storage, transfer, and visualization of digital medical images and documents of examined patients, and others

The MOH decided a few years ago to adopt these global standards for health data but they have not been fully implemented in Ukraine. They cannot be prioritized amongst these five, because they are very different in nature (some define the file types for medical imaging, while others define the structure of the messaging). The EU has no security/privacy standards, but they have regulations, the GDPR. This situation has led to a lack of integration of telemedicine services (devices) with various MISs and with the eHealth system that provides centralized data storage. The process of data exchange between telemedicine devices and MIS/eHealth is complex, which is in part due to a failure to implement consistent standards in Ukraine.

## FINANCING TELEMEDICINE INFRASTRUCTURE

So far, government investments have mainly supported the development and implementation of eHealth system in Ukraine rather than specific telemedicine solutions, although there have been several initiatives to invest in the establishment of national and regional telemedicine centers. In 2018, the MOH and NHSU established and since then have been gradually developing along with donor support, a national eHealth System to support transformation of health care system and health financing reforms. The current eHealth development plan includes development and integration of telemedicine.

Since its introduction, the NHSU has followed two major principles for PMG purchasing: it must be done based on reliable and timely data, and health care providers contracting with the NHSU must meet IT standards. This was a major factor that pushed regional authorities and health care providers to invest in health care IT infrastructure, including computers, internet connections, MIS, basic skills, and so forth so that health facilities could be contracted by the NHSU. It also pushed the private sector to bring to the market more competitive products (MISs) for the new clients (health providers). All health providers contracted by the NHSU must use and pay for one of the MISs to be able to exchange information with the NHSU. Currently, some MISs already offer telemedicine services (see Annex A).

Funding for telemedicine solutions has come from different sources, including national and subnational governments, donors, and private sector companies. Because telemedicine infrastructure and software are currently categorized the same as IT equipment and MIS, health care institutions, local governments, and the cabinet ministers are the primary responsible parties for funding. However, over half the providers surveyed indicated that to practice telemedicine, they had to either purchase the needed devices with their own money or use their personal phones, computers, and other devices. For more information see figure 11.

# SUMMARY OF KEY FINDINGS

This section summarizes the key findings from the telemedicine landscape assessment.

### PRIORITY POPULATIONS AND SERVICES

The most frequent users of telemedicine are vulnerable groups such as internally displaced people, people living in occupied/recently liberated areas, people with disabilities, people living in rural areas, the elderly, and people with chronic diseases, including mental health conditions. The respondents stated their use of telemedicine has increased since the COVID-19 pandemic and full-scale war began. Those in regions who have experienced active hostilities use the largest share of telemedicine services. PHC providers actively use telemedicine services, focusing on prescription of medicine, treating symptoms of fatigue, and conducting general consultations. Patients mostly frequently use telephone conversations, messengers, chatbots, or zoom calls to facilitate teleconsultations, e-prescriptions, and e-referrals. The share of telemedicine services recorded within the eHealth database is relatively small but does not include the telemedicine services provided beyond the PMG. Given information provided directly to researchers from medical practitioners and patients, it seems likely that a significant number of telemedicine-supported consultants and interactions with patients were provided outside of the eHealth system.

Barriers to access such as lack of information about availability/eligibility, perceived lack of tools for service provision, and poor internet access continue to plague telemedicine, resulting in less effective service provision. Additionally, the lack of standard terminology and requirements for telemedicine services provided within the scope of the PMG results in an inconsistent approach. This also limits the effectiveness and availability of service provision. This lack of data makes it difficult to formulate effective policy to progress telemedicine in Ukraine.

### TRENDS AND RECENT TELEMEDICINE EXPERIENCES

Telemedicine is used throughout Ukraine. The onset of the COVID19 pandemic fostered some growth in the use of telemedicine, and then the full-scale Russian invasion had the impact of furthering and accelerating use both with donated war time solutions, and with simple “low-tech” methods such as telephone calls and various chat or text applications. Regions that have experienced active war, such as those occupied and de-occupied have had the highest share of use of telemedicine in the last 9 months of 2022. Across Ukraine, several regional administrations have experience with telemedicine investments and public sector projects to increase the availability of doctor to doctor and doctor to patient telemedicine care. Lessons can be drawn from those experiences, and further examination is warranted into the success factors cited such as: leadership, clear strategy, communications and business processes, trainings of providers, investment in needed equipment, and the importance of reliable internet.

### ENABLING ENVIRONMENT FOR TELEMEDICINE

#### STAKEHOLDERS

Analysis of stakeholders involved in the development and provision of telemedicine services in Ukraine demonstrates a wide range of governmental, non-governmental, and private sector institutions, including health care providers, MIS providers, IT software and solutions, professional and patients’ organizations, educational institutions, media, donors and international organizations, health insurance companies, financial companies, banks, and local businesses. The MOH and the SOE eHealth have a direct responsibility for the development and implementation of telemedicine, information, and information-telecommunication systems

for the health care system in Ukraine. The monitoring of telemedicine services does not appear to be assigned to any stakeholder.

### REGULATORY FRAMEWORK

The main provisions of the regulatory framework were formed before 2018 and do not account for the changes caused by the reform of the health care funding system and the opportunities provided by the Electronic Healthcare System. The current procedure for providing medical care using telemedicine was developed for a particular technical and organizational model, with a telemedicine network and the use of a specialized internet platform. Health sector stakeholders consider outdated regulatory environment is a significant obstacle to the development of telemedicine. One particularly acute problem is that obtaining a patient's informed voluntary consent must be done in person; current regulations do not allow it to be obtained remotely. There are also unresolved issues with authenticating patients when using telemedicine.

### FINANCING

The health financing reforms initiated by the GOU in 2017 have contributed to the growing interest in and development of telemedicine. These reforms have pushed the rapid development of e-health, the modernization of IT infrastructure at the health provider's level and contributed to the expansion of the MIS market in Ukraine. Through the PMG's purchasing mechanisms (contact requirements and specifications), the NHSU has enabled the use of telemedicine in the delivery of PMG-covered health care services. Despite these gains, funding for telemedicine infrastructure (both hardware and software) remains fragmented. Financing for telemedicine services flows from different sources, including national and subnational governments, donors, and the private sector. Currently, the GOU lacks a clear set of priorities for development of telemedicine. This negatively impacts funding of telemedicine. There is a general lack of clarity among patients and providers on whether telemedicine services are available under the PMG and who is responsible for funding telemedicine infrastructure/solutions.

### READINESS AND ATTITUDES OF HEALTH CARE PROVIDERS

The analysis demonstrated that telemedicine services are provided for primary, specialized, and emergency care, in facilities of all ownership types, and in all regions of Ukraine. Survey participants recognized the efficiency and importance of telemedicine services. However, health care professionals providing such services do not feel confident because they often lack knowledge and experience using telemedicine. Sometimes they purchase equipment at their own expense and cite regulatory and financial barriers to expanding telemedicine services.

## TELEMEDICINE INFRASTRUCTURE

Before the full-scale invasion of Ukraine, conditions for development of telemedicine were favorable: a wide network of internet and mobile phone coverage was formed (although this connection was less accessible in rural areas), health care facilities were provided with computers at a fairly high level during the recent health care reforms, and equipment was gradually updated. However, devices do not have the ability to interact directly with the central eHealth database, only indirectly, through MISs (in case of their integration). The increase in demand for telemedicine services caused by COVID-19 and the full-scale war have led to an increased number of private telemedicine online platforms/systems and mobile applications that provide teleconsultation services (patient-doctor and doctor-doctor(s)) in synchronous and asynchronous formats (see Annex D). However, most of them are not integrated with the MISs and central eHealth database. Despite the significant damage to critical infrastructure (including health care facilities) the Russian invasion has caused, the demand for telemedicine services

continues to grow. Because of this, the development of the technical components of telemedicine should remain a priority to ensure availability of medical care in the post-war period.

# RECOMMENDATIONS

There are recommendations stemming from this assessment, to address specific needs of Ukraine in 2023 to expand telemedicine. These are for the consideration of the Government of Ukraine, and other health sector stakeholders.

## ADDRESS BARRIERS TO ACCESSING VULNERABLE POPULATIONS

### 1. CONDUCT INFORMATION CAMPAIGNS ON TELEMEDICINE AVAILABILITY AND ELIGIBILITY

It appears that many telemedicine consultations are occurring outside of the PMG, which could be linked in part to lack of awareness of PMG coverage for those services. Informing the population of the services available both within and outside of the PMG is crucial to facilitating greater use of existing telemedicine services. These information campaigns should highlight that, in many cases, simple, widely available technology (such as cell phones) is all that is needed to use the services. Multi-pronged national campaigns can be designed to reach the communication needs of specific segments of the population and in priority geographic areas. Include information on the types of services that patients can access, including PHC services such as chronic and infectious disease monitoring and mental health consultations.

### 2. IDENTIFY AND ADDRESS POLICY AND PROCESS BARRIERS TO PATIENT ACCESS

Address barriers with the objectives of furthering the following:

- The possibility for the patient to initiate/choose to receive medical care via telemedicine
- The use of telecommunication available to the patient (internet, mobile connection, and landline service) for receiving medical care
- The use of both synchronous and asynchronous consultation technologies
- The procedure for using technologies for remote monitoring of health and screening
- The procedure for obtaining remotely the informed voluntary consent of the patient to provide medical care using telemedicine
- The procedure for authenticating patients when receiving medical care using telemedicine

### 3. IMPROVE ACCESS TO BASIC TELEMEDICINE TOOLS FOR DOCTORS AND PATIENTS

Providing doctors and patients with tools that allow them to remotely provide/receive counselling and medical information, and measure and transmit health indicators will help to mitigate a significant barrier to uptake. Introducing special features catering to vulnerable groups will stimulate the development of telemedicine services by meeting the needs of those who benefit most from telemedicine, such as persons with visual and hearing impairments, people with limited mobility, and people with insufficient experience in using a phone/computer. This should be supplemented by training and other capacity building efforts to providers so they can use telemedicine effectively and efficiently, making them more likely to initiate telemedicine services with their patients.

## STRENGTHEN THE ENABLING ENVIRONMENT TO FOSTER GROWTH

### 4. PRIORITIZE TELEMEDICINE STRATEGY AND INVESTMENT AT THE NATIONAL LEVEL

Ensure that successful telemedicine initiatives are fostered through integration in eHealth, mental health and other service strategies, and as a central tool to reconnect vulnerable populations to care. As part of these efforts, address outdated policies and align them with changes in the health care system due to health finance reform, the development of the eHealth System, and challenges in providing medical care caused by epidemic threats, war, and their consequences. Establish strategies and mechanisms to strengthen the capabilities of national and subnational government offices to leverage public private partnerships as sources of investment and innovation in telemedicine service delivery.

### 5. REVISE PMG PACKAGES TO CLARIFY AND STANDARDIZE TERMINOLOGY, AND DEFINE REQUIREMENTS AND PURCHASING ARRANGEMENTS FOR SERVICES USING TELEMEDICINE

The MOH can create a consistent approach to telemedicine across the board, with clear guideline, by standardizing the terminology and requirements for telemedicine within the PMG. The NHSU may consider refining relevant PMG service packages to standardize telemedicine terminology and gradually clarify basic requirements for telemedicine services. This will ultimately increase both greater availability and quality of care, as it lowers the barrier to entry for providers.

### 6. ESTABLISH AN INSTITUTIONAL FRAMEWORK FOR MONITORING SERVICE UTILIZATION VIA TELEMEDICINE

Data collection could be facilitated by the NHSU, potentially be presented on the NHSU site in the form of a Dashboard, with open data on the provision of medical services by means of telemedicine (like other Dashboards on the NHSU website). The current NHSU category “patient’s consultation by communications means” allows analysis of telemedicine services by region, type of care, disease, health care facility ownership, and other categories. In the future, additional telemedicine services such as telemetry or teleradiology could also be included in the monitoring system.

### 7. CONDUCT A STUDY TO EXPLORE COSTS AND FUNDING SOURCES OF TELEMEDICINE SERVICES AND INFRASTRUCTURE TO INFORM PMG PURCHASING ARRANGEMENTS FOR FINANCING TELEMEDICINE WITHIN THE PMG

The NHSU may also consider conducting a study to understand the costs (and cost structure) of providing telemedicine services at the facility level. The findings will inform further refinement of PMG purchasing arrangements and payment mechanisms.

## ADDRESS CRITICAL INFRASTRUCTURE NEEDS

### 8. EXPLORE INTEROPERABILITY FOR TELEMEDICINE SOLUTIONS AND DATA STORAGE

The GOU should consider strategic investment in the development of centralized technical solutions for the eHealth System that allows patients to make an appointment for teleconsultation and search for the necessary institutions and doctors across various MISs. Such an eHealth functionality, easily and opening available to all patients enrolled in PMG, will serve to break down barriers to accessing remotely provided care, as well as to increase transparency in the system.

Mechanisms for storage or access to diagnostic data would allow a patient (or a doctor with the patient's consent) to receive such data regardless of the place of storage or the place where the patient receives medical care. This would facilitate a higher quality of care by lowering barriers to service provision.

## 9. PRIORITIZE STANDARDS FOR COMPATIBILITY, EXCHANGE, STORAGE, AND USE OF MEDICAL INFORMATION

The GOU should prioritize adopting and expanding the use of international standards for compatibility, exchange, storage, and use of medical information. Greater application of standards could ensure the relevant telemedicine hardware and software tools transmit any medical information promptly and efficiently and keep patient data secure; these tools include HL7 FHIR[24], OpenEHR[25], and ISO/IEC, DICOM.[26] Moving toward an interoperable system of coordinated MISs will facilitate both higher quality of care and ensure access to the full range of health care services available and guaranteed by the PMG.

[24] See Fast Healthcare Interoperability Resources, https://hl7.org/fhir/
[25] See Open Electronic Health Record, https://www.openehr.org/
[26] See Digital Imaging and Communications in Medicine, https://www.dicomstandard.org/

## CONCLUSION

As it demonstrates its resiliency and moves further in reconstruction, Ukraine has an opportunity to leapfrog the development of telemedicine as a tool to reconnect patients to essential services. There is opportunity to expand care, especially those needing care for chronic and infectious diseases and mental health. Groups that before the full-scale war faced barriers to accessing care (rural populations, the elderly and disabled among others) and populations displaced by the war and/or living in recently occupied territories should be prioritized for expanded access to quality care using telemedicine. Crises create space for development by stimulating interest and out-of-the-box solutions; the increasing positive experience of health care providers in telemedicine use during the COVID-19 pandemic and wartime should be further supported and promoted. To do that, collaboration among stakeholders and development partner support can be leveraged to overcome contextual, regulatory, organizational, and financial obstacles to increased used of telemedicine by among health care professionals and patients, especially the most vulnerable. There is momentum among Ukrainian health sector leaders and stakeholders at national and subnational levels, and Ukraine's development partners have an opportunity to support strategic investments and technical support to turn war time challenges and experiences, into a stronger more resilient health system with fully integrated digital solutions optimizing limited health financing resources and reducing barriers to accessing care among the population.

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# ANNEX A. MEDICIAL INFORMATION SYSTEMS CONNECTED TO CENTRAL E-HEALTH DATABASE

**Table A1. MISs Connected to Central eHealth Database by Functionality**

| MIS name | e-sick leave | e-prescription | e-referral | Online consultation tool | Additional information |
|---|---|---|---|---|---|
| **Dnipro-MT (*Дніпро-МТ*)** | yes | yes | yes | n/a | |
| **Doktor Eleks (Доктор Елекс)** | yes | yes | yes | n/a | |
| **Dorado (Дорадо)** | yes | yes | yes | n/a | |
| **Elektronna Likarnya 2.0 (Електронна лікарня 2.0)** | yes | yes | yes | n/a | |
| **EMSIMED (ЕМСІМЕД)** | yes | yes | yes | n/a | |
| **IS SZKh (ІС СЗХ)** | yes | yes | no | n/a | |
| **Kashtan (Каштан)** | yes | yes | yes | n/a | |
| **MEDEYR (МЕДЕЙР)** | yes | yes | yes | n/a | |
| **MedInfoServis (МедІнфоСервіс)** | yes | yes | yes | n/a | |
| **MIA: Zdorov'ya (MIA:Здоров'я)** | yes | yes | yes | n/a | |
| **Ukrmedsoft (Укрмедсофт)** | yes | yes | yes | n/a | |
| **Askep** | yes | yes | yes | no | |
| **Clinica Web** | yes | yes | yes | n/a | |
| **DocDream** | yes | yes | yes | n/a | |
| **EvoMIS** | yes | yes | yes | yes | Telemedicine platform MEDINET |
| **Health 24** | yes | yes | yes | n/a | |
| **Healthtech** | yes | yes | no | yes | |
| **Lakmus** | no | yes | yes | yes | Online counseling tool with integration with Zoom |

| MIS name | e-sick leave | e-prescription | e-referral | Online consultation tool | Additional information |
|---|---|---|---|---|---|
| **Helsi** | yes | yes | yes | yes | |
| **MEDICS IT** | yes | yes | yes | yes | Sending private messages administered in platform-based chat rooms |
| **MEDSTAR** | yes | yes | yes | yes | Telemedicine complex IDIS<br>Telemedicine platform TELEMED24 |
| **nHealth** | yes | yes | yes | yes | Telemedicine platform 4Patient |
| **SimplexMed** | yes | yes | yes | yes | |
| **SimplexMis** | yes | yes | yes | n/a | |
| **Apteka 911 (Аптека 911)** | n/a | yes | n/a | n/a | |
| **BICA** | n/a | yes | n/a | n/a | |
| **TerraLab** | n/a | yes | n/a | n/a | |
| **Pharma Space** | n/a | yes | n/a | n/a | |
| **3i** | n/a | yes | n/a | n/a | |
| **Tabletki** | n/a | yes | n/a | n/a | |
| **eApteka-Kompedium (еАптека-Компендіум)** | n/a | yes | n/a | n/a | |
| **Skarb (Скарб)** | n/a | yes | n/a | n/a | |

Updated February 2023

# ANNEX B. AREAS OF STAKEHOLDER INVOLVEMENT

**Table B1. Areas of Stakeholders' Involvement in Telemedicine Implementation and Development**

| Stakeholders | Creating policies and regulations | Organizing of medical care | Paying for services | Service provision | Capacity building | Investing in infrastructure and equipment | Developing software solutions equipment | Informing and promoting services | Lobbying |
|---|---|---|---|---|---|---|---|---|---|
| **Patients** | | | X | | | X | | X | X |
| **State institutions** | | | | | | | | | |
| **Parliament** | X | | | | | | | | |
| **President** | X | | | | | | | | |
| **Cabinet of Ministers** | X | | | | | | | | |
| **MOH** | X | X | | | | | | X | |
| **Ministry of Digital Transformation** | X | | | | | | | | |
| **NHSU (incl. Academy and eHealth System)** | | | X | | X | X | | X | |
| **SOE eHealth** | | | | | | X | X | | |
| **Local authorities** | X | X | X | | | X | | X | |
| **Pre and post education institutions (medical and IT specialists)** | | | | | X | | | | |

| Stakeholders | Creating policies and regulations | Organizing of medical care | Paying for services | Service provision | Capacity building | Investing in infrastructure and equipment | Developing software solutions equipment | Informing and promoting services | Lobbying |
|---|---|---|---|---|---|---|---|---|---|
| **Health care providers** | | | | | | | | | |
| **Health care facilities** | | X | | X | X | X | | X | X |
| **Private entrepreneurs** | | | | X | | X | | X | |
| **Health workers** | | | | X | | X | | X | |
| **Manufactures and developers** | | | | | | | | | |
| **Telemedicine equipment and software manufacturers** | | | | | X | | X | X | X |
| **MIS companies** | | | | | X | | X | X | X |
| **Other telemedicine solutions developers (eHealth System, applications, etc.)** | | | | | X | | X | X | X |
| **Other businesses** | | | | | | | | | |
| **Insurance companies** | | | X | | | | | X | |
| **Financial companies/ Banks** | | | X | | | | | X | |
| **Socially responsible business** | | | X | | X | X | | X | |

| Stakeholders | Creating policies and regulations | Organizing of medical care | Paying for services | Service provision | Capacity building | Investing in infrastructure and equipment | Developing software solutions equipment | Informing and promoting services | Lobbying |
|---|---|---|---|---|---|---|---|---|---|
| **Influencers and media** | | | | | | | | | |
| **Mass-media** | | | | | | | | X | |
| **Opinion leaders** | | | | | | | | X | X |
| **Civil society/ NGOs** | | | X | X | X | X | | X | X |
| **Professional associations (health care workers)** | | | | | X | | | X | X |
| **Professional associations (Telemedicine ICS, etc.)** | | | | | X | | X | X | X |
| **Donors, international organizations, and technical assistance projects** | | | | | | | | | |
| **USAID** | | | X | X | X | X | | X | |
| **World Bank** | | | | | X | X | | | |
| **GFATM** | | | X | X | X | X | | X | X |
| **UNICEF** | | | | | X | X | | X | |
| **UNDP** | | | | | | X | | | |
| **WHO** | | | | | X | | | X | |
| **LHSS** | | | | | X | X | | X | |
| **STBCEU** | | | X | X | X | X | | X | |
| **ReLAB-HS** | | | | | | | X | | |

# ANNEX C. AUTHORITY OF THE STAKEHOLDERS

According to the Article 19 of the Constitution of Ukraine, bodies of state power and bodies of local self-government and their officials are obliged to act only on the grounds, within the limits of authority, and in the manner envisaged by the Constitution and the laws of Ukraine.[27]

The stakeholders are described in regard to their authority/power and areas of responsibility.

**Authority of the Ministry of Health of Ukraine**

The Regulations on the MOH approved by Resolution No. 267 of the Cabinet of Ministers of Ukraine on March 15, 2015, empower the MOH with the authority to organize medical care of the emergency, primary, secondary (specialized), and tertiary (highly specialized) levels, palliative medical care, and medical rehabilitation and to provide medical services by specialty, including the use of telemedicine.[28]

In addition, the MOH is authorized to organize and maintain a procedure for the functioning of information and analytical systems, information resources, electronic registers, and databases created, implemented, and managed in the healthcare system according to the areas specified by the Regulations.

**Authority of the State Enterprise eHealth**

The Regulations of the State-Owned Enterprise eHealth approved by Order No. 1886 of the MOH on August 22, 2019, specify the mission of the enterprise as providing effective development and functioning of information, , and information-telecommunication systems, including electronic healthcare systems (eHealth), by way of implementing software products, computerizing data collection and processing, administration and provision of data security, provision of information services in the area of data processing, analysis and systematization; economic, business, investment, commercial and other entrepreneurial activities, including the market of services and trade operations, attracting grants and foreign investments for the development of capacities and infrastructure required for the effective functioning and development of electronic systems in healthcare, and as well performing other activities for profit generation not prohibited by law.[29]

**Authority of the Cabinet of Ministers of Ukraine**

The Law of Ukraine “On the Cabinet of Ministers of Ukraine” specifies that the CMU provides the implementation of state policy in the following areas (i) budgetary, financial, price, and investment including depreciation, taxation, and economic branches; labor and population employment, social protection, healthcare, education, science and culture, nature protection, environmental safety, and nature management; (ii) healthcare, sanitary-epidemic well-being, maternity and childhood care, education, physical culture, and the availability of medical, educational, and health-care facilities for citizens; (iii) develop and implement measures to

[27] See Article 19 in the *Constitution of Ukraine*: https://rm.coe.int/constitution-of-ukraine/168071f58b.
[28] See the Cabinet of Ministers Resolution No. 267 *On the Approval of the Regulation on the Ministry of Health of Ukraine*: https://zakon.rada.gov.ua/laws/show/267-2015-%D0%BF#Text.
[29] See *Regulations of the State-Owned Enterprise eHealth*: https://ehealth.gov.ua/wp-content/uploads/2020/02/Statut-DP-Elektronne-zdorovya-vid-22.08.2019.pdf.

create the material and technical resources and other conditions require for appropriate functioning of healthcare, education, culture and sports, tourism and recreation areas.[30]

### Authority of the Ministry of Digital Transformation of Ukraine

According to the Regulations, the Ministry of Digital Transformation of Ukraine participates in (i) the formulation of state policy in cryptographic and technical information protection, cyber protection, telecommunications, use of radio frequency resources of Ukraine, special purpose postal communications, government field service communications, protection of state information resources specified by the legislation regulating information, telecommunication and information-telecommunication systems and objects of information activities, the use of state information resources regarding information protection, countering technical intelligence, functioning, security and development of the state government communications systems and the National Confidential Communications System; (ii) development of criteria and procedure for assessing the security condition of state information resources in information and telecommunication systems; organization and assessment of the security condition of the state information resources, provision of relevant recommendations; (iii) development of proposals for the state policy on regulation of telecommunications, use of radio frequency resources; (iv) determination of quality requirements for telecommunication services; (v) development of technical requirements for telecommunications networks, means and objects of telecommunications.[31]

### Authority of the Ministry of Defense of Ukraine

Regulations of the Ministry of Defense of Ukraine of November 26, 2014, No. 671 vest the Ministry of Defense with the powers to specify priority areas and forecasts for the development and improvement of the healthcare system of the Armed Forces, develop programs for the development of the system of medical support of the Armed Forces in peacetime and a special period, organize their implementation and perform state control and supervision of the healthcare in the Ministry of Defense and the Armed Forces.[32]

### Authority of the Ministry of Veterans Affairs of Ukraine

The Regulations of the Ministry of Veterans Affairs of Ukraine approved by Resolution No. 1175 of the Cabinet of Ministers of Ukraine on December 27, 2018, specify that the Ministry of Veterans Affairs of Ukraine in agreement with the MOH shall develop a list of medical services for veterans and their family members, not included in the list of medical services in Program of the State Medical Guarantees for the population paid by the state.[33]

### The Local Authorities

The Law On Local Self-Government in Ukraine specifies the powers of local self-government, in particular in the healthcare area.[34] Alongside the Law of Ukraine On Local State Administrations

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[30] See the *Law On the Cabinet of Ministers of Ukraine*: https://zakon.rada.gov.ua/laws/show/794-18#Text.
[31] See *Regulations of the Ministry of Digital Transformation*: https://zakon.rada.gov.ua/laws/show/856-2019-%D0%BF#Text.
[32] See *Regulations of the Ministry of Defense:* https://zakon.rada.gov.ua/laws/show/671-2014-%D0%BF#Text.
[33] See *Regulations of the Ministry of Veterans Affairs*: https://zakon.rada.gov.ua/laws/show/1175-2018-%D0%BF#Text.
[34] See the *Law On Local Self-Government in Ukraine*: https://zakon.rada.gov.ua/laws/show/280/97-%D0%B2%D1%80#Text.

vests the local administrations to perform the following functions in the healthcare area (i) resolution of issues, (ii) control, (iii) financing, (iv) implementation of the state policy, and (v) participation in the development of international cooperation.[35] The local bodies of self-governance should become financially independent in the implementation of the local healthcare policy as part of the decentralization.[36] The local authorities have the right to finance their health facilities from the local budgets, as this area is one of the priorities. The responsibilities of local government include the financing of (i) communal services, (ii) energy sources, and (iii) support of the material base of institutions. Additionally, local governments can fund local incentive programs, such as the purchase of office housing and additional financial bonuses on top of workers' base salaries.[37] In addition, local self-governance bodies can help attract additional funds for their health facilities, in particular, funds from international technical assistance or funds from charitable and other organizations.

**Authority of the National Health Service of Ukraine**

According to the Regulations of the National Health Service of Ukraine approved by the Resolution of the Cabinet of Ministers of Ukraine on December 27, 2017, No. 1101, the NHSU develops a draft Medical Guarantee Program and draft specifications and conditions for the procurement of medical services under the Medical Guarantee Program as well as makes proposals on tariffs and adjustment coefficients.[38]

According to the Law of Ukraine No. 2168 On State Financial Guarantees of Medical Services for the Population, the Medical Guarantee Program specifies the list and scope of medical services, health products, and medicines, whose full payment is guaranteed to patients by the state at the expense of the state budget of Ukraine in compliance with tariff rates for prevention, diagnosis, treatment and rehabilitation in connection with diseases, injuries, poisoning, and pathological conditions, as well as in connection with pregnancy and childbirth.[39]

According to the Regulations of the National Health Service of Ukraine, it's also responsible for the functioning of the eHealth system, management of its registries, data verification, approval of technical requirements to MIS. In practical terms it means that the NHSU influences on the management, financing and developments of eHealth and through that - on the technical requirements and development of telemedicine.

The NHSU also has a department called Academy of NHSU that is responsible for informational and educational services for the contracted health providers. It provides a number of courses that explains peculiarities of the Medical Guarantee Program and related eHealth modules. Some courses contain explanations on telemedicine elements within eHealth modules and health service packages.[40]

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[35] See the *Law On Local State Administrations*: https://zakon.rada.gov.ua/laws/show/586-14#Text.
[36] See the *Decree On the Approval of the Concept of Reforming Local Self-Government and Territorial Organization of Power in Ukraine*: https://zakon.rada.gov.ua/laws/show/333-2014-%D1%80#Text.
[37] See Vashkovetska Rural Territorial Community, Chernivtsi Oblast, Dnistrovsky Raion. *Financing of Health Care Facilities Starting on January 1, 2021*: https://vashkovetska-gromada.gov.ua/news/1609086058/.
[38] See *Decree On Establishment of the National Health Service of Ukraine*: https://zakon.rada.gov.ua/laws/show/1101-2017-%D0%BF#Text.
[39] See the *Law On State Financial Guarantees of Medical Services for the Population*: https://zakon.rada.gov.ua/laws/show/2168-19#Text.
[40] See available courses on the NHSU Academy website: https://academy.nszu.gov.ua/.

**Authority of the State Service of Special Communications and Information Protection of Ukraine**

According to the Regulations of the Administration of the State Service of Special Communications and Information Protection of Ukraine approved by Resolution No. 411 of the Cabinet of Ministers of Ukraine on September 3, 2014, the main tasks of the SSSCIP Administration are to ensure the formation and implementation of the state policy in the fields of cryptographic and technical information protection, telecommunications, use of radio frequency resources of Ukraine, special purpose postal communications, government field service

communications, protection of state information and its resources established by law in the information, telecommunication and information-telecommunication systems and on information activity objects, as well as in the areas of using state information resources as part of information protection, countering technology intelligence, functioning, security and development of the National Telecommunications Network, the state government communication system, the National Confidential Communication System; protection of cyberspace of state information and its resources established by law, cyber protection of critical information infrastructure, implementation of state control in these areas.[41]

Based on the analysis of the normative acts regulating the activities of the authorities, the MOH and the SoE eHealth have a direct responsibility for the development and implementation of telemedicine, telecommunication, information, and telecommunication solutions for the healthcare system in Ukraine. Other institutions are responsible for the organization and provision of (i) medical care in specific territorial communities or for certain population groups or (ii) infrastructure or (iii) telecommunication solutions, although the concept of telemedicine is not clearly mentioned.

[41] See *Regulations On the Administration of the State Service of Special Communications and Information Protection*: https://zakon.rada.gov.ua/laws/show/411-2014-%D0%BF#Text.

# ANNEX D. TELEMEDICINE PLATFORMS OPERATING IN UKRAINE

**Table D1. Telemedicine Platforms/Systems/Mobile Applications Operating in Ukraine**

| General info | Type of communication | Content of services | Geography and partners |
|---|---|---|---|
| **Telemedicine platform Doctor Online: https://doctoronline.care/** | | | |
| • Over 1.5 million users<br>• 600+ doctors<br>• Service of round-the-clock<br>• Can be paid online on the platform | • Video, audio call or chat in the mobile add | • Consultations of doctors<br>• Making a preliminary diagnosis<br>• Prescribing examinations, treatment plan and drug recommendations | ***Partners:***<br>• Network of laboratory centers Synevo<br>• System of ordering and delivery of medicines Liky24<br>• Various insurance companies |
| **Telemedicine network Medinet: https://medinet.com.ua/** | | | |
| • 4,500+ doctors<br>• 34,000+ telemedicine doctor-to-doctor consultations | | • Doctor-to-doctor and doctor-to-patient consultations<br>• Recording, collecting statistics and doing analytics related to COVID-19 | ***Geography:***<br>• Professional telemedicine network of Ukraine for all levels of medical care<br>• Started in 2019 in Odesa oblast<br>• 431+ medical institutions<br>• Works in Cherkasy, Kharkiv, Kherson, Odesa, Vinnytsia, Zhytomyr, and Zaporizhzhia oblasts |
| **Telemedicine system Telemed24: https://telemed24.ua/** | | | |
| | • A module integrated into the medical information system Medstar<br>• Video chat or telephonic communication | • Consultations and registration of the results of remote receptions<br>• Formation of a referral for diagnostics or analysis<br>• Setting up a calendar for monitoring the patient's health indicators<br>• Fixing in an electronic medical record and transmitting the episode to eHealth | |
| **Telemedicine system Anima: https://anima.help/** | | | |
| | • Eye-tracking technology via webcam of the device | • Consultations on psychological problems in difficult life situations<br>• Assessment of behavioral reactions allows to determine the level of anxiety, depression and predict the risk of developing dangerous conditions | |

| General info | Type of communication | Content of services | Geography and partners |
|---|---|---|---|
| **Medical communication platform Medikit: https://medikit.ua/** | | | |
| • The possibility of paying online on the platform | • Chat, video or audio communication | • Doctor-patient consultations<br>• Specialists of various specializations | ***Partners:***<br>• Insurance companies |
| **Telemedicine portal Medbrama: https://medbrama.com/** | | | |
| • 4,900 patients<br>• 230 doctors<br>• Round-the-clock electronic assistant/secretary | • Online video and audio communication<br>• Notifications and reminders via SMS, e-mail, web application messages<br>• No need for additional computer programs | • Doctor-doctor and doctor-patient consultations<br>• 12 types of services for patient<br>• Patient's data in electronic form<br>• Attaching to consultations the results of diagnostic tests of MRI, CT, radiographs, results of laboratory diagnostics, etc.<br>• Working with data from clinical cases, so that all necessary information is transmitted, with the exception of the patient's personal data | |
| **Telemedicine platform Telehelp Ukraine: https://telehelpukraine.com/** | | | |
| • 120+ doctors and 80+ volunteers<br>• 800+ video visits<br>• Free assistance | • integration with Viber or Telegram messengers using video visit scheduling | • Medical and psychological assistance<br>• Medical consultations on pediatrics, cardiology, neurology, dermatology, rheumatology, endocrinology, oncology, pain treatment etc. | ***Geography*:**<br>• Doctors are from all over the world |
| **Mobile application Doctor Online: https://likaronline.com.ua/** | | | |
| • Round-the-clock | • Video/ audio/ chat | • Communication with the attendant and attending physician<br>• Compliance with all consultation standards (history taking, consultation, conclusion) | |
| **Medical Information System HELSI: https://helsi.me** | | | |
| • 24,304,070 patients<br>• 37,134 doctors<br>• 231,763 appointments daily | • Online consultations | | ***Geography*:**<br>• The most common MIS on the territory of Ukraine<br>• 1,312 clinics |

| General info | Type of communication | Content of services | Geography and partners |
|---|---|---|---|
| **International humanitarian technical assistance in the form of telemedicine platforms / systems / mobile applications** | | | |
| **Home Doctor telemedicine system: https://homedoctor.es/** | | | |
| | • Medical bot | • Consultation of a patient at home with doctors who are in the hospital<br>• Doctor can monitor the patient's vital signs in real time during the consultation and make a professional diagnosis<br>• Opportunity to diagnose blood pressure, body temperature, measurement of blood oxygen saturation, to monitor the patient's cardiogram<br>• Modern wireless stethoscope allows listening to the lungs and heart<br>• A specialized backlit camera. allows video diagnostics of the skin, ear, nose | • Country of origin: Spain |
| **Brainscan telemedicine system: https://brainscan.ai/** | | | |
| • Implemented in the most famous emergency hospitals, diagnostic and outpatient health facilities in Poland<br>• Processes almost 7,000 CT scans of the head per month | • Vertically located solution with a focus on brain analysis<br>• System of decision support for the interpretation of computerized tomography of the brain | • Pathology detection system by analyzing CT scans<br>• The results of the analysis are displayed as infographics and structured text and returned to the PACS server from which they were sent<br>• the infographic platform is available in every DICOM viewer used by doctors. | • Country of origin: Poland |
| **Rehabilitation Gaming System telemedicine system: https://www.eodyne.com/** | | | |
| | • Neurorehabilitation solution using a personal computer, gadgets and any augmented reality tools | • Comprehensive treatment of deficiencies in patients arising from brain damage and support motor apparatus<br>• Performing rehabilitation exercises in a playful way<br>• Doctor can monitor the implementation of the patient's rehabilitation plan<br>• Doctor can perform statistical analysis of errors in the elimination of exercises and correction of tasks in the rehabilitation of patients | |

| General info | Type of communication | Content of services | Geography and partners |
|---|---|---|---|
| **VSee telemedicine system: https://vsee.com/** | | | |
| • 500 man-years of telemedicine engineering<br>• 250 configuration points without any coding | • Customizable omnichannel connectivity | • VSee puts doctors in the manager's shoes, giving them control over their work processes personally<br>• VSee allows the engineer to create and deploy a telemedicine mobile application using simple APIs and ready-made modules | |
| **Teladoc Solo Platform telemedicine platform: https://www.teladoc.com/** | | | |
| • 12,000 customers worldwide<br>• 12.5+ million telemedicine consultations in 2022 | • Robotic complexes of virtual presence | • The ability to integrate with existing IT systems, including EMR, reduce point solutions and total cost of ownership<br>• Round-the-clock preventive monitoring and technical support of patients and medical teams ensure the smooth operation of the systems and reduce the burden on IT | • Providers of the TelaDoc platform are TM Teladoc and WTI, multinational companies based in the United States |
| **Carebits telemedicine platform: https://www.carebits.pl/** | | | |
| • Medical staff of the company works 24/7 | • A software and hardware complex that includes a mobile device Sigmafon for remote monitoring of patients and a software platform Carebits | • Conducting a CTG study and recording it with sending it to the patient/doctor's mobile application, and then to the obstetric surveillance computer system<br>• Analysis of the research results and its presentation in digital and graphic interpretation<br>• The possibility of early detection of heart abnormalities and hypoxic conditions<br>• The ability to read the results of the study by the midwife or doctor | • Country of origin: Poland |
| **Epiqar telemedicine platform: https://epiqar.com/** | | | |
| • Specialized global support in real time<br>• The possibility of up to ten participants together (all HD)<br>• Interactive webinars with thousands of guests | • A hardware and software solution for organizing online broadcasts during surgical operations<br>• Encrypted private global network | • Ease of deployment – installation in the surgery room in 2 minutes<br>• Ease of use by the surgery team and remote users of Mac/ Windows/ iOS/ Android Record videos in a private cloud library hands-free using the Epiqar pedal<br>• Storing snapshots in your private cloud library hands-free using the Epiqar foot pedal<br>• A specially created platform for real-time surgery training | • Country of origin: the United States |

| General info | Type of communication | Content of services | Geography and partners |
|---|---|---|---|
| **Mental health applications** | | | |
| **Mindly: https://startup.google.com/stories/mindly/** | | | |
| • 15,000+ users | • End-to-end mental health platform<br>• The consultation is conducted over video from Mindly app | • The users register, then select what type of help they need (couple's therapy, cognitive behavioral therapy, gestalt therapy, etc.), then based on that selection, the users are given a list of psychologists that contains the specialists' bios, credentials, and hourly rates. The patient can then choose the specialist and set an appointment | • Country of origin: Ukraine |
| **Teplo: https://teplo.app/** | | | |
| • Cost: 690 UAH per week<br>• Free to everyone whose request is related to the war | | • The users download the app, register, then the users answer some questions, and AI picks a specialist for the patient | • Country of origin: Ukraine |
| **UA Mental Help: https://uamentalhelp.org/** | | | |
| • Free services<br>• Charity organization founded in May 2022<br>• 1600+ consultations<br>• 2000+ patients | | • Mental health consultations and psychological education<br>• The patient fills out a form, the coordinator processes it, and the patient is then matched with the specialist<br>• 50-minute-long consultations online<br>• Up to 12 free consultations | • Country of origin: Ukraine |
| ***Rozkazhy meni* (Tell me): https://tellme.com.ua/#about** | | | |
| • Free services<br>• Only for adults (18+) | • Online platform | • Psychological help<br>• Mostly works with cognitive behavioral psychology | • Country of origin: Ukraine |
| ***Tviy psycholog* (Your psychologist): https://www.potsilunky.com/tviy-psycholog** | | | |
| • Paid services | | • The users identify the problem they want to work on and choose a specialist from the list provided on the website (the list includes a specialist's short bio, key issues they usually work with, and how much they charge per 50 or 80 mins).<br>• Then a patient makes a payment and sets up the appointment | • Country of origin: Ukraine |

| General info | Type of communication | Content of services | Geography and partners |
|---|---|---|---|
| **Help24: https://help24.org.ua/uk/** | | | |
| • 3,280 registered patients<br>• 1,464 consultations<br>• Free services | • Online | • Consultations with psychologists, physicians, and lawyers<br>• The chat consultation lasts no longer than 30 minutes<br>• If necessary, the coordinator redirects the patient to the specialist and provides next steps | • Country of origin: Ukraine |
| ***Hub stiykosti* (Resilience hub): https://resiliencehub.com.ua/** | | | |
| • Free services | • Video consultation | • Psychological help to Ukrainians that were affected by the war<br>• A patient chooses a specialist from the list available on the website | • Country of origin: Ukraine |
| **Pleso: https://pleso.me/** | | | |
| • 1,950 patients<br>• 9,800 consultations | • Website | • A patient completes a form/self-assessment on the website, then chooses a specialist from the list available on the website. The website contains the therapist's bio, credentials, and hourly rate. The patient books an appointment, makes a payment, and receives a Zoom link to the session | • Country of origin: Ukraine |
| ***UkrYednist'* (UkrUnity): https://ukr-ednist.com.ua/about/** | | | |
| • Free services<br>• 55+ qualified specialists in the field of mental health | | • Psychological assistance to Ukrainians affected by the war (psychological first aid, psychological support session, crisis counseling)<br>• Each specialist has agreed to provide from one to three free online consultations although everyone has the right to decide how many consultations to conduct depending on the situation | • Country of origin: Ukraine |
| **Meclee: https://meclee.com/** | | | |
| | | • A patient completes self-assessment test and then chooses a specialist that best matches his/her needs. The list of mental health specialists is available on the website, along with the psychologists' bios, credentials, and hourly rates | • Country of origin: Ukraine |

| General info | Type of communication | Content of services | Geography and partners |
|---|---|---|---|
| **Rootd: https://www.rootd.io/2022/06/04/ukrainian-translation/** | | | |
| • Over 1 million users worldwide | • In addition to text, the app contains guided audio for helping someone in a moment of distress, as well as calming guided visualizations | • #1 ranked mobile app for panic attack and anxiety relief on both iOS and Google Play<br>• A panic button for when individuals are actually going through a panic attack<br>• A deep breathing tool (most people with anxiety tend to be shallow breathers)<br>• A body scan tool (for a form of active meditation)<br>• A journal tool (for building confidence)<br>• Guided visualizations and soothing nature sounds<br>• a gamified stats page so that users can track progress and celebrate successes | • Country of origin: Canada<br>• Launched in Ukraine in June 2022 |
| **VOS: https://vos.health/story/premium-mental-health-support-free-for-all-ukrainians-standwithukraine** | | | |
| • 1.2 million users worldwide<br>• Free access | | • 8 therapeutic tools, such as guided journaling, breathing exercises, mood monitoring, and unlimited online chat with psychologists<br>• VOS also aggregates platforms that have emerged as mental health initiatives during the war so that users can find updated information on helplines they can turn to in case they need emergency counseling | • Country of origin: Czech Republic<br>• Launched in Ukraine in March 2022 |
| **Viveo: https://viveohealth.com/free-online-doctor-consultation-for-ukraine/** | | | |
| • Free services<br>• 3,000+ patients<br>• Thousands of consultations within the first 150 days of the full-scale invasion | • Phone (audio or video) consulting | • Telehealth (includes psychologists) platform | • Country of origin: Estonia |
| **KAF: https://www.kaf-assist.org/en** | | | |
| • Free services | • Video call<br>• Chat in Discord, WhatsApp, Messenger, and Telegram | • Remote medical and emotional assistance for teens and adults<br>• Private video call with Ukrainian-speaking mental health specialists, who will be able to help and provide emotional support on in trying times. The service is in intended for all ages, adult supervision required<br>• Anonymous chat for emotional, social, and mental support for teens | • KAF is an Israeli cooperation of three Israeli companies — Kai, Amplio and Femi.<br>• The services are delivered from Israel by Ukrainian-speaking Israelis. |

| General info | Type of communication | Content of services | Geography and partners |
|---|---|---|---|
| **Mobile applications for diabetic patients** | | | |
| **Sugarrr: https://sugarrr.io/** | | | |
| | | • The app gathers carbs, blood sugar levels, activity, and insulin data<br>• Artificial intelligence organizes data, calculates trends, finds patterns, and makes predictions.<br>• Sugarrr connects with patient's glucometer or CGM. But if they don't have a Bluetooth device, they open the camera and scan any data they need. Sugarrr will do the rest | • Country of origin: Ukraine<br>• The company is registered in the U.S., but it was originally established in Kyiv |
| ***Super Ya* (Super me): https://www.facebook.com/appsuperme/** | | | |
| | | • Helps children independently control their diet and lead a full-fledged lifestyle even with type 1 diabetes<br>• There is also a self-monitoring diary in which information about the insulin dose, sugar level, food, and activities are recorded. | • Country of origin: Ukraine |
| **Diabetes:M: https://diabetes-m.com/about-us/** | | | |
| | • Cloud-based mobile app for people with diabetes and pre-diabetes<br>• Remote monitor software platform for medical professionals | • Logbook is the place where the patient can enter the glucose readings, insulin injections and carbohydrate amount;<br>• Bolus Advisor screen where the patient can calculate the insulin units for the meal<br>• Food database contains a categorized list with most common foods and products | • Country of origin: Bulgaria |

LOCAL HEALTH SYSTEM SUSTAINABILITY PROJECT