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HOW RUSSIAN-UKRAINIAN WAR CHANGED THE USAGE OF TELEMEDICINE: A QUESTIONNAIRE-BASED STUDY IN UKRAINE

Vitalii Poberezhets[1], Anna Demchuk[1], Yuriy Mostovoy[1]

[1] National Pirogov Memorial Medical University, Department of Propedeutics of Internal Medicine, Vinnytsya, Ukraine

Correspondence:
Vitalii Poberezhets (e-mail: poberezhets_vitalii@vnmu.edu.ua)

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Ankara Yıldırım Beyazıt University Faculty of Medicine
Department of Family Medicine

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Abstract

Objectives: Russian military aggression caused the biggest crisis in Ukraine since WWII. Telemedicine could become a solution for Ukrainian healthcare to cope with these challenges, considering previous experience and available resources. We aimed to assess features of telemedicine in Ukrainian during the war.

Materials and Methods: We used a cross-sectional approach to receive feedback from 125 Ukrainian medical practitioners performing clinical practice in Ukraine during the war. E-questionnaire was distributed among doctors via social media announcements, specific doctors' associations in messengers and direct messages.

Results: We found that 99.20% of doctors (n=124) continued using telemedicine during the war. 56.80% of the respondents (n=71) highlighted that the war resulted in the acceleration of telemedicine usage. The most popular telehealth services were instant messaging apps (97.60% of doctors, n=122) and phone calls (84.80% of doctors (n=106). Compared to less experienced colleagues, medical practitioners with more than 10 years of clinical practice more intensively used e-mail (46.15% vs 19.18%; χ^2=10.444, p=0.001), SMS (34.62% vs 15.07%; χ2=6.512, p=0.011), remote pulse oximetry (19.23% vs 5.48%; χ2=5.774, p=0.016), blood glucose monitoring (11.54% vs 2.74%; χ2=3.925, p=0.048). The main restriction of using telemedicine was an inability to perform an effective objective examination.

Conclusion: Our research showed that the ongoing Russian-Ukrainian war had accelerated the use of telemedicine by Ukrainian medical practitioners. The most common telemedical services were messengers and direct phone calls. Experienced doctors more frequently used e-mail, SMS and devices for remote patient monitoring.

Keywords: Telemedicine, Russian-Ukrainian war, wearables.

Introduction

The biggest humanitarian crisis in Europe since the Second World War is currently developing in Ukraine due to eight years of Russian military aggression with the new powerful impulse initiated by the large-scale war on 24 February 2022. As a result, after five months of the war, 6.3 million Ukrainians remain internally displaced and 5.8 million across Europe. Millions of people in the temporarily occupied territories and regions with intense hostilities faced difficulty accessing medicines and healthcare.[1]

The Ukrainian healthcare system, which was previously affected by the COVID-19 pandemic, faced several challenges in providing appropriate health care to all citizens. Firstly, most internally displaced persons (IDPs) stayed in the Western and Central Ukrainian regions like the Vinnytsia Oblast. It caused increasing pressure on the health care infrastructure in that territory. At the same time, health facilities in the regions under hostilities regularly experience attacks by the Russian army. World Health Organization (WHO) has already officially verified 390 attacks on health care infrastructure and transport in Ukraine that caused injuring and killing of healthcare staff.[2] Health care facilities in the occupied territories have been cut off from the supply of medications, medical oxygen, equipment and consumables and cannot transport patients who need more intensive care. Additionally, the Ukrainian economy is deeply affected by military actions, the inability to use seaports to export commodities, and regular missile air strikes on the infrastructure of the whole territory with human casualties. The World Bank estimates that Ukraine's economy will shrink by 45.1% in 2022 but could become more devastating depending on the duration and intensity of the Russian invasion.[3]

Active usage of telemedicine could become a solution for Ukrainian healthcare to cope with all these challenges considering that telemedicine could provide cost-effective, accessible care and clinical services for a vulnerable population living in different locations, including remote areas with limited access to healthcare facilities. Traditional telehealth services include video visits, telephone calls, secure messaging and remote patient monitoring using wearables.[4] Healthcare & Public Health Sector Coordinating Councils, additionally to the clinician-to-patient category of telehealth services, also highlight the importance of clinician-to-clinician services that includes communication between clinicians to share clinical information and discuss patient care, telementoring and training.[5]

In 2016 Ukraine made a step forward in the adoption of telemedicine, realizing the project "Support Reforms and Good Governance in the Health System in Ukraine" by the Government of Ukraine with the collaboration of the World Bank and the Swiss Development Cooperation Office in Ukraine.[6] Starting in 2019, regional telemedicine centers were opened in major cities all over Ukraine to provide telemedicine clinician-to-clinician consultations.[4]

Ukraine has a great prerequisite for broader implementation of telehealth services because of the availability of Internet access (more than 75% of the population used the Internet in 2020), widespread mobile cellular access (129 mobile cellular subscriptions per 100 people in 2020), the broad rollout of third-generation (3G) and fourth-generation (4G) networks in rural areas and including telemedicine in the Program of Medical Guarantees that allows it to be reimbursed by National Health Service of Ukraine.[4,7] Moreover, the 2020 United Nations Development Program (UNDP) survey showed that 53% of the responding Ukrainians obtained at least one e-government service in the last 12 months. Respondents chose medical services as the sector most important to have additional or better electronic services.[8]

Before the war, the Ukrainian healthcare system had advancements in developing telemedical services in several fields, including cardiology,[9,10] pulmonology,[11-13] otolaryngology,[14,15] oncology,[16] and rehabilitative medicine.[17,18]

Unfortunately, there is no current data presenting the influence of war on how medical practitioners in Ukraine use telemedical services. Moreover, there is no recent research on the preferred telemedical services by medical doctors in Ukraine, which makes the estimation of the current situation and perspectives on using telemedicine unclear. We aim to investigate how the ongoing Russian-Ukrainian war changes the usage of telemedicine by Ukrainian medical practitioners and to define what telehealth services are used during the war.

Materials and Methods

We assessed features of telemedicine in Ukraine by applying a cross-sectional approach. The sample size of this research reached 125 Ukrainian medical practitioners.

The inclusion criteria for participants of this study consisted of the willingness to become respondents, signed informed consent, and appropriate digital literacy to fill the e-questionnaire. Moreover, respondents have to confirm that they have a valid medical license to perform medical practice in Ukraine and are currently working as medical doctors in Ukraine during the war.

Our team created the Google form e-questionnaire to assess telehealth services used by medical practitioners and the change in telemedicine use during the Russian-Ukrainian war. The Google form was distributed among Ukrainian medical practitioners through several channels of communication: via social media announcements (Facebook, Twitter, Instagram), via specific physicians' associations in messengers (Viber group of young scientists of National Pirogov Memorial Medical University, Vinnytsya with more than 150 members, Viber group of the Podillia Association of medical doctors with over 300 members, Viber group dedicated to

postgraduate education of medical doctors with over 3000 members) and by the direct messages to clinicians from the database of the research team based on a previous collaboration initiative (WhatsApp, Viber, Telegram or e-mail).

Questionnaire description

This questionnaire was designed in Ukrainian. It included ten questions. The clinicians should choose their specialization, work experience, and percentage of their clinical work done using telemedicine and indicate whether usage of telemedicine was increased, decreased or not changed after the Russian large-scale military invasion. The scope of telemedicine used was another question for understanding whether the doctors used it for clinician-to-patient communications, clinician-to-clinician communications or both. Clinicians were asked to define what telehealth services they use with a separate question to investigate how they use messenger applications. Participants were asked about the technical solutions used for telemedicine and to tell about their points of dissatisfaction with telemedicine. It was obligatory to provide the informed consent of the survey participant to complete the questionnaire, with the statement that the participant has a valid medical license to perform medical practice in Ukraine. Participation was anonymous.

The study was conducted during the active military Russian invasion of Ukraine, from mid-April to mid-July 2022.

Statistical analysis was performed using IBM SPSS Statistics version 26.0. Descriptive statistics were used in our research. All continuous variables were presented with mean ± standard deviation (SD). The Pearson chi-square test was used to compare categorical variables between the groups of medical doctors with various clinical experiences. P-values <0.05 were considered to be statistically significant.

Results

We received responses from 125 Ukrainian medical practitioners, most of whom were internists and general practitioners (GP). However, 18 different medical specialties were represented in the questionnaire (Figure 1).

Participants of our research were equally distributed based on their clinical experience: 51 (40.80%) medical practitioners had less than five years of clinical experience, 22 (17.60%) had from 5 to 10 years of clinical experience, and 52 (41.60%) were the most experienced with more than ten years of clinical work.

Most medical doctors (n=124, 99.20%) continued using telemedicine in their practice in Ukraine during the ongoing war (figure 2). Only one clinician did not use any telemedical solutions in practice. Almost 70% of medical practitioners (n=86) reported that 1% to 30% of their clinical visits were performed via telemedicine.

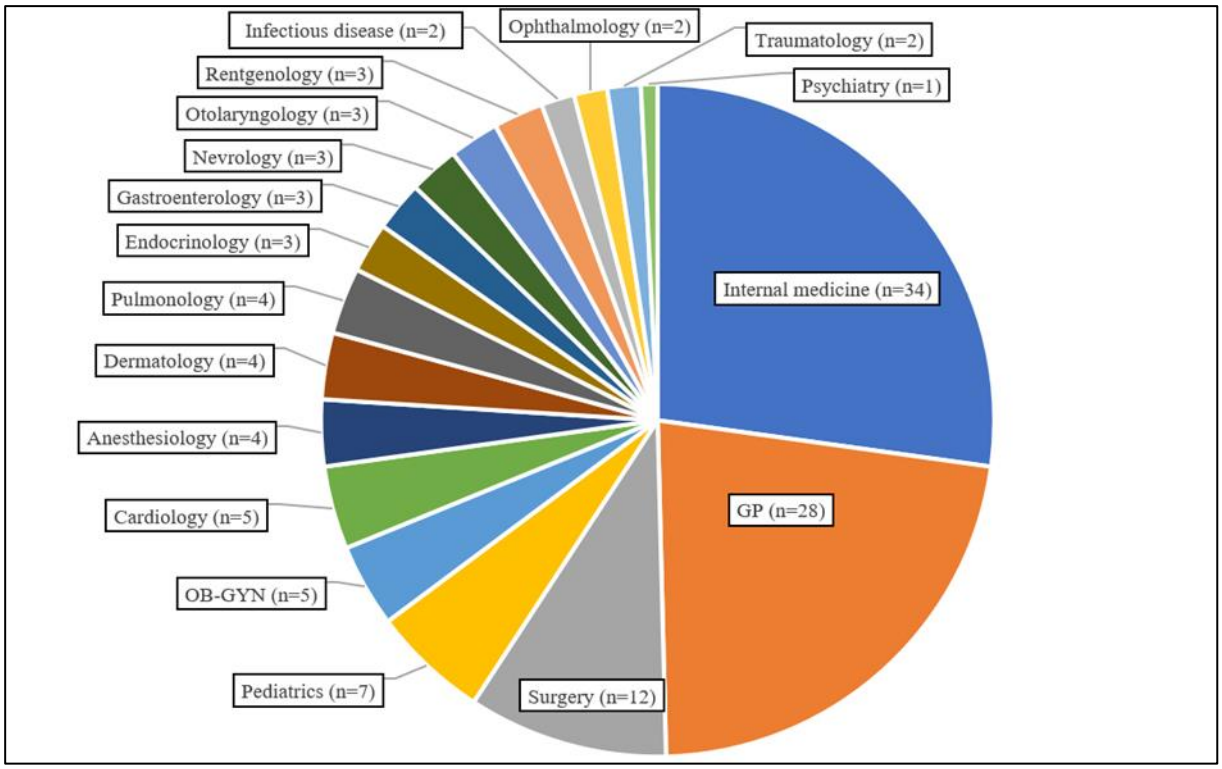

Figure 1. Structure of medical specialties presented in the research (OB-GYN: Obstetrics and Gynecology GP: General Practitioner)

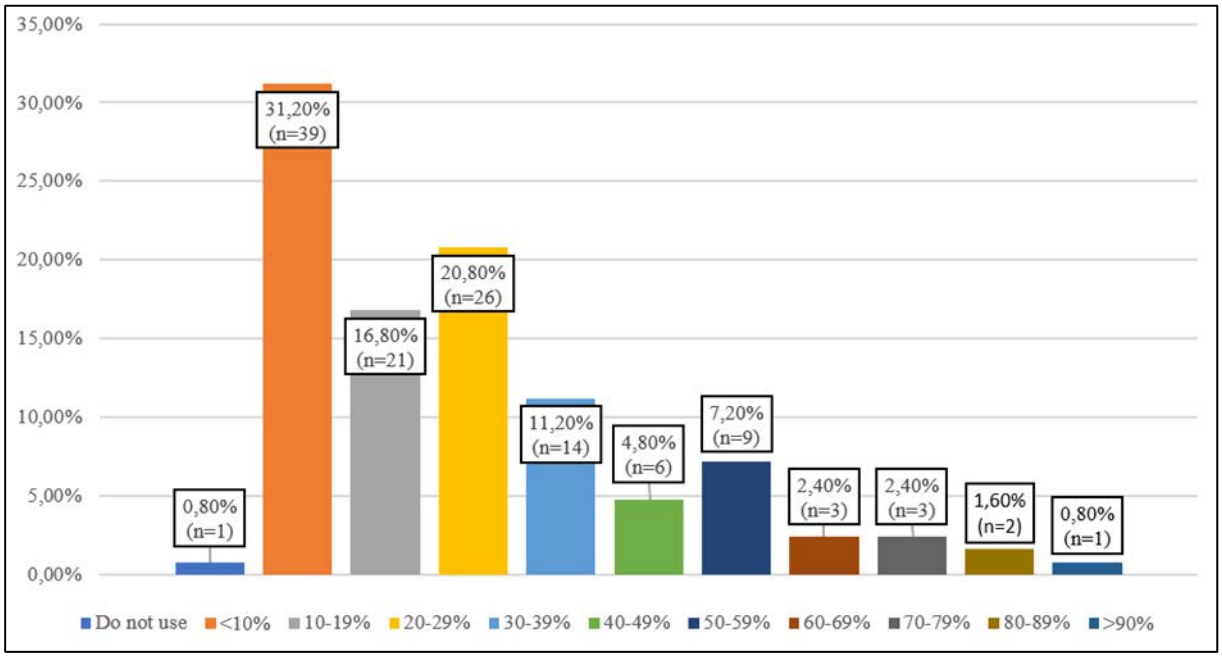

Figure 2. Percentage of telemedicine in clinical workflow during the war

At the same time, most respondents highlighted that the ongoing war resulted in the accelerating of telemedicine use by them (n=71, 56.80%) and 46 (36.80%) doctors noted that war did not influence their use of telemedicine. Only 8 (6.40%) medical doctors reported a reduction in telemedicine. Using both clinician-to-patient and clinician-to-clinician telemedicine services was reported by 97 (77.60%) respondents. Seventeen (13.60%) medical practitioners used telemedicine only for clinician-to-patient services, and ten responders (8%) used only the clinician-to-clinician category.

Only ten responders (8%) used the official software platforms for telemedicine (Figure 3). Others used unofficial services to interchange information both with colleagues and patients. Among these solutions, the most popular was using instant messaging apps (Viber, Telegram, WhatsApp) reported by 122 (97.60%) medical practitioners. These apps were used to exchange text messages in 86.40% of cases (n=108), exchange photos or video messages in 77.60% of cases (n=97), as a platform for video meetings in 38.40% of cases (n=48) and exchange audio messages in 30.40% of cases (n=38). The second most common way of communication was a phone call to the patient or colleague, which was highlighted by 106 (84.80%) doctors. Every third medical practitioner used e-mails or video meeting apps (Zoom, Skype, Google Meet, Microsoft Teams) as a telemedical solution, and every fourth doctor used Short Message Service (SMS).

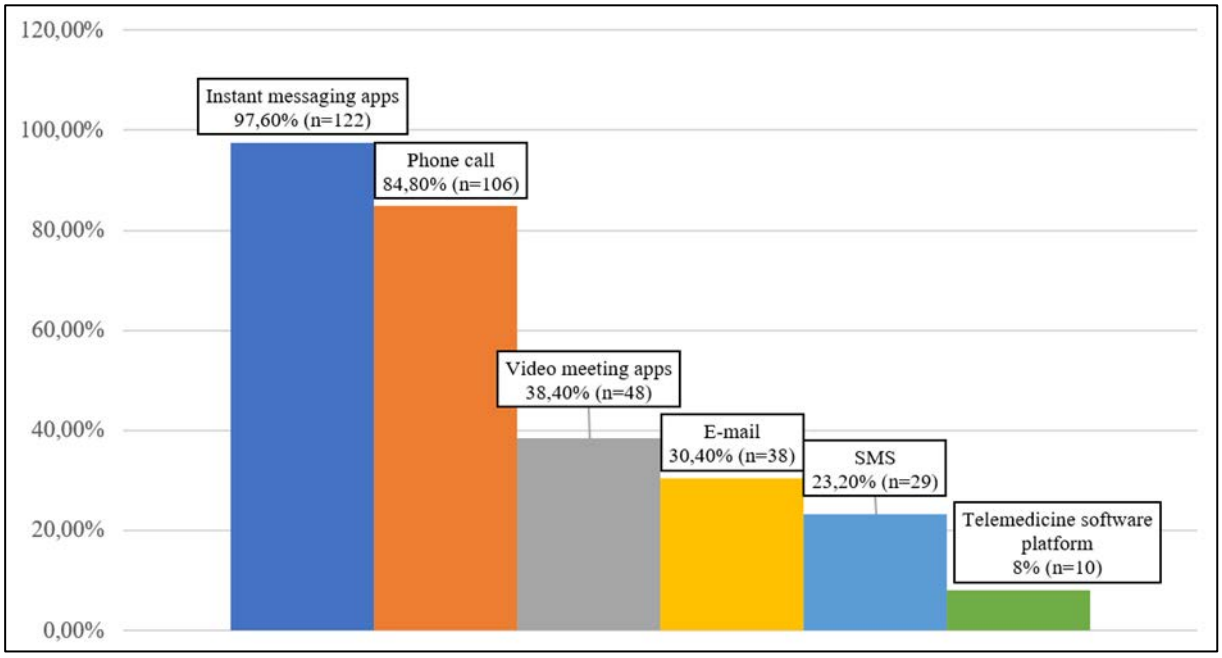

Figure 3. Telehealth services used for telemedicine

Instant messaging apps and phone calls were the most common types of services used by medical practitioners with various clinical experiences (Table 1). However, doctors with more than ten years of clinical experience showed higher usage of e-mail and SMS compared to their less experienced colleagues (46.15% vs. 19.18%; $\chi2=10.444$, $p=0.001$) and 34.62% vs. 15.07%; $\chi2=6.512$, $p=0.011$). Moreover, more experienced clinicians used instant messaging apps more often for video meetings (53.85% vs. 27.40%; $\chi2=8.981$, $p=0.003$), with no significant difference in other ways of its use (exchange of text, photo, video or audio messages).

Table 1. Distribution of telehealth services based on the clinical experience of medical practitioners

	≤10 years of clinical experience (n=73)	>10 years of clinical experience (n=52)	P-value
Instant messaging apps	97.26% (n=71)	98.08% (n=51)	0.769
• text messages	87.67% (n=64)	84.62% (n=44)	0.623
• photo/video messages	78.08% (n=57)	76.92% (n=40)	0.878
• video meetings	27.40% (n=20)	53.85% (n=28)	0.003*
• audio messages	30.14% (n=22)	30.77% (n=16)	0.940
Phone call	86.30% (n=63)	82.69% (n=43)	0.580
Video meeting apps	34.25% (n=25)	44.23% (n=23)	0.258
E-mail	19.18% (n=14)	46.15% (n=24)	0.001*
SMS	15.07% (n=11)	34.62% (n=18)	0.011*
Telemedicine software platform	9.59% (n=7)	5.77% (n=3)	0.438

The smartphone was the most popular technology solution for telemedical purposes. It was used by 117 (93.60%) of our respondents (Figure 4). More than half of medical doctors (56.80% (n=71)) used laptops. For remote patient monitoring, the wearable finger pulse oximeter was used by 14 doctors (11.20%), the blood glucose monitor by eight doctors (6.40%), the peak flow meter and the spirometer by one doctor (0.80%).

We found out that more experienced doctors more intensively used solutions for remote patient monitoring compared to their less experienced colleagues: statistically higher usage of the pulse oximeter (19.23% vs. 5.48%; $\chi2=5.774$, $p=0.016$) and blood glucose monitor (11.54% vs. 2.74%; $\chi2=3.925$, $p=0.048$) (Table 2).

During our research, we received feedback from 37 medical practitioners based on their points of dissatisfaction with the adoption of telehealth in the Ukrainian health care system. The main restriction of using telemedicine was an inability to perform an effective objective examination of the patients, and this limitation was pointed out by 21 respondents (16.80%). Six respondents highlighted an unstable internet connection during telemedical communication as the most critical restriction (4.80%). Imperfect payment systems and legislation issues for telemedical services were highlighted as the main issues by five medical doctors (4%), and low health and digital literacy among patients by another five doctors (4%).

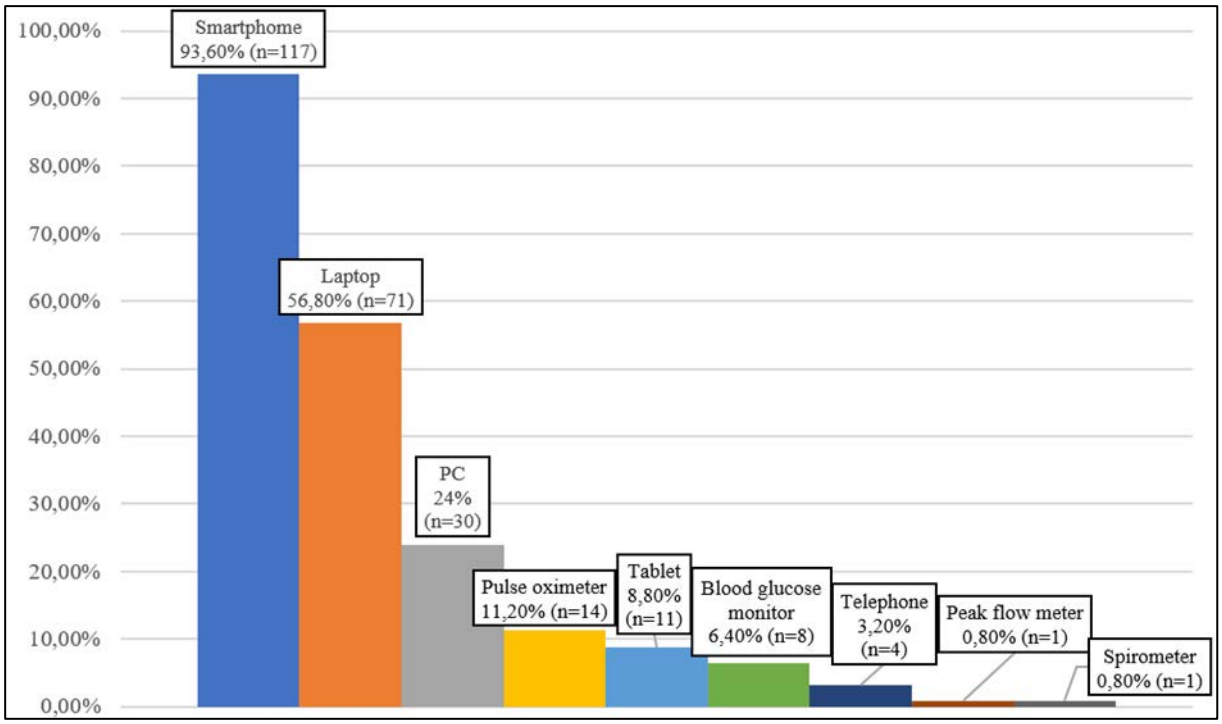

Figure 4. Technical solutions used for telemedicine (PC: Personal Computer)

Table 2. Distribution of technical solutions based on the clinical experience of medical practitioners

	≤10 years of clinical experience (n=73)	>10 years of clinical experience (n=52)	P-value
Smartphone	94.52% (n=69)	92.31% (n=48)	0.618
Laptop	58.90% (n=43)	53.85% (n=28)	0.574
PC	21.92% (n=16)	26.92% (n=14)	0.518
Pulse oximeter	5.48% (n=4)	19.23% (n=10)	0.016*
Tablet	9.59% (n=7)	7.69% (n=4)	0.712
Blood glucose monitor	2.74% (n=2)	11.54% (n=6)	0.048*
Telephone	2.74% (n=2)	3.85% (n=2)	0.729
Peak flow meter	-	1.92% (n=1)	0.234
Portable spirometer	-	1.92% (n=1)	0.234

*Statistically significant

Discussion

To the best of our knowledge, this is the first study showing that the ongoing Russian-Ukrainian war increased the intensity of using telemedicine for most respondents, compared to doctors who reported that war had no influence on telemedicine usage or resulted in a decrease in it accordingly. These changes in using telemedicine were also stimulated by the Ministry of Health of Ukraine, which launched access to a free medical consultation through the contact center of the Ministry of Health for all Ukrainians during martial law in Ukraine.[19]

Syrian cardiologists had recently presented a similar tendency in using telemedicine during the war; when this country's healthcare system was faced with destroyed or seriously damaged health facilities, millions of displaced citizens and physicians fled the country. In such circumstances, telecardiology helped alleviate some of this disastrous shortage in health care coverage for patients with cardiovascular diseases.[20]

Perspectives and the importance of using telemedicine to respond appropriately to such manufactured disasters as the war was already highlighted in the North Atlantic Treaty Organization (NATO) development, a Multinational Telemedicine System (MnTS) for disaster response. This system was tested in Euro-Atlantic Disaster Response Coordination Centre's (EADRCC) Exercises Ukraine 2015 showed that using an integrated system focused on Web-based tools showed that it could provide citizens with appropriate medical care much more effective than traditional methods.[21]

Almost all medical practitioners who participated in our survey reported that they used telemedicine in their clinical practice in Ukraine during the ongoing war, which was unexpectedly high. Most respondents reported that about one-third of the clinical workflow was done by telemedicine. Since there are no specific statistics on the exact number of Ukrainian doctors using telemedicine in their practice, our research provides unique data. It happened because Ukrainian medical doctors and their patients used messengers and direct telephone calls for telemedical purposes that could not be officially registered and covered by the National Health Center of Ukraine or insurance companies. However, before the COVID-19 pandemic during the previous five years, the telemedical market in Ukraine demonstrated 46% growth, with further advancements during the pandemic period presenting positive background for the current active use of telemedicine. As of October 2021, there were officially registered 26 Ukrainian telehealth providers. One of the largest professional telemedicine networks in Ukraine – Medinet, reported that over 4 500 doctors from 624 medical institutions provided 18 000 teleconsultations using their platform by April 2021.[4]

It is impossible to compare our results with other countries experienced in military countries because the current Russian-Ukrainian war is the most significant military conflict in Europe since the Second World War. It is the largest war in a developed country with telemedical services. That is why we compared our results with data from other countries during the COVID-19 pandemic and noticed that our data are representable and highlight the high level of adoption of telemedicine in Ukraine despite the ongoing war. According to data from the Centers for Medicare and Medicaid Services (US), during the COVID-19 pandemic use of telemedicine greatly depended on medical specialty varying from 68% of clinical visits for endocrinologists to 9% - for ophthalmologists. From January to June 2020, about one-third of all visits were provided via telemedicine, which is quite similar to current data from Ukraine, where most physicians reported the same amount of visits provided via telemedicine[22]. Our data correlate with another data published by a UK-wide National Health Service (NHS) survey aimed to assess video consulting across England, Northern Ireland, Scotland and Wales

from January 2020 to August 2021. The reported proportion of video consultations during the first six months of the COVID-19 pandemic was the highest in Scotland (45%) and the lowest in Wales (25%).[23] Moreover, according to the British Medical Association, 65.13% of GPs provided remote consultations for their patients in May 2020 compared to 93.70% of Ukrainian GPs in our survey during the current war and pandemic.[24]

Notably, almost all our respondents did not use official software platforms for telemedicine but preferred using other services like instant messaging apps (Viber, Telegram, WhatsApp). The reason for this tendency includes inaccessibility to official telemedicine software platforms that had just started developing in Ukraine before the war and the disorganization of healthcare during the first months of the war. Data reported from Syria during the ongoing Syrian conflict also state that in the case of the military situation, physicians prefer using low-cost solutions to share and receive data from patients or colleagues. Syrian cardiologists used social media platforms and apps to provide care to their patients.[20] However, using unofficial technical platforms and solutions for telemedicine raises data privacy concerns. Unfortunately, Ukraine is not subject to the European Union (EU) General Data Protection Regulation that could guarantee the safety of personal data through the verified application. However, in 2021 Ukraine has registered Law Draft "On Personal Data Protection", following obligations under the EU Association Agreement that is expected to become effective in 2023.[25]

Our respondents considered the inability to objectively examine patients during teleconsultation as the most significant barrier to implementing telemedicine, with further emphasis on legislation issues, remuneration plans, connection issues, data transfer and low literacy among patients. These results are quite typical, and the usual barriers to telemedicine implementation worldwide are presented in the vast majority of previous research.[26] In the research performed in China among physicians during the COVID-19 pandemic, respondents also highlighted the inability to examine patients in person as the most significant barrier to telemedicine usage.[27] The same as in our research, Chinese physicians pointed out that, for better promotion of telemedicine, it is crucial to develop performance measures, including monetary incentives and improved policy support.

Our study has several limitations. First, our research included only medical practitioners with a high-level digital literacy, allowing them to fill the e-questionnaire while making these persons more susceptible to digital technologies in their clinical practice. Moreover, our study could not be scaled to the county level because we received data from clinicians, mostly from Vinnytsia Oblast. However, we consider the Vinnytsia Oblast representative on the national scale because it is one of the largest central regions of Ukraine, which became a new home for many citizens running from the war. Almost 170000 IDPs are officially registered in the Vinnytsia Oblast, including almost 1500 people with disabilities, which caused an increase in the regional population to more than 10%.[28] Health care system of this region provides care for previous residents, IDPs and wounded soldiers under the economic issues, restrictions of martial law and Russian missile attacks.[29]

In conclusion, our results show that the ongoing Russian-Ukrainian war has accelerated the use of telemedicine by Ukrainian medical practitioners as a solution to provide quality care for patients even at the frontline. Medical doctors in Ukraine used various telemedical services with messengers and direct phone calls forming the predominant part of the workflow. Experienced medical doctors more frequently used e-mail, SMS and devices for remote patient monitoring compared to their less experienced colleagues.

Ethical Considerations: The research does not require ethical approval, considering anonymous data collection without information about participants' health status or other sensitive topics.

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References

1. United Nations High Commissioner for Refugees. Ukraine Situation Flash Update #21 [Internet]. https://reliefweb.int/report/ukraine/ukraine-situation-flash-update-21-15-july-2022. (Accessed 05.09.2022).
2. WHO. SURVEILLANCE SYSTEM FOR ATTACKS ON HEALTH CARE (SSA) [Internet]. https://extranet.who.int/ssa/LeftMenu/Index.aspx?utm_source=Stopping attacks on health care QandA&utm_medium=link&utm_campaign=Link_who. (Accessed 05.09.2022).
3. The World Bank. Russian Invasion to Shrink Ukraine Economy by 45 Percent This Year [Internet]. https://www.worldbank.org/en/news/press-release/2022/04/10/russian-invasion-to-shrink-ukraine-economy-by-45-percent-this-year. (Accessed 05.09.2022).
4. USAID Health Reform Support U. TELEMEDCINE MARKET ASSESSMENT Rapid Assessment of Telemedicine in Ukraine [Internet]. https://pdf.usaid.gov/pdf_docs/PA00XWZR.pdf. (Accessed 05.09.2022).
5. American Hospital Association. Health Industry Cybersecurity - Securing Telehealth and Telemedicine [Internet]. https://www.aha.org/guidesreports/2021-04-20-healthcare-and-public-health-sector-coordinating-councils-public-private. (Accessed 05.09.2022).
6. Support Reforms and Good Governance in the Health System in Ukraine [Internet]. https://www.eda.admin.ch/deza/en/home/countries/ukraine.html/dezaprojects/SDC/en/2016/7F09631/phase1. (Accessed 05.09.2022).
7. The World Bank. Mobile cellular subscriptions (per 100 people) - Ukraine [Internet]. https://data.worldbank.org/indicator/IT.CEL.SETS.P2?locations=UA. (Accessed 05.09.2022).
8. United Nations Development Programme. Electronic services: experiences, trust, accessibility [Internet]. https://www.undp.org/ukraine/publications/electronic-services-experiences-trust-accessibility. (Accessed 05.09.2022).
9. Sobianin I, Skonechnyi V, Yarova I. Portable Electrocardiograph with Gsm Module for Telemedicine. Technical Sciences and Technologies. 2020(1(19)):191-8 (doi:10.25140/2411-5363-2020-1(19)-191-198).
10. Kolisnyk K, Deineko D, Sokol T, Kutsevlyak S, Avrunin O. Application of modern internet technologies in telemedicine screening of patient conditions. 2019 IEEE Int Sci Conf Probl Infocommunications, Sci Technol. 2019;459–64 (doi:10.1109/PICST47496.2019.906.9061252).
11. Slepchenko N, Mostovoy Y, Dmytriiev K, et al. Efficacy of instant messages applications in smoking cessation in patients with COPD. Eur Respir J. 2021;58:PA3455 (doi:10.1183/13993003.congress-2021.PA3455).

12. Slepchenko N, Mostovoy Y, Tsymbaliuk N, Sidorov A, Dmytriiev K, Shostatska M. Do technologies make a difference in adherence to treatment: instant messaging application use? European Respiratory Journal. 2020(56):1359 (doi:10.1183/13993003.congress-2020.1359).
13. YouTube. Dr Vitalii Poberezhets [Internet]. https://www.youtube.com/channel/UC3-gCdfux6KuAj0NGmOlUYw. (Accessed 05.09.2022).
14. Avrunin O, Kolisnyk K, Nosova Y, et al. Improving the Methods for Visualization of Middle Ear Pathologies Based on Telemedicine Services in Remote Treatment. IEEE KhPI Week on Advanced Technology (KhPIWeek). 2020,pp.347–50 (doi:10.1109/KhPIWeek51551.2020.9250090).
15. Skarżyński PH, Świerniak W, Ludwikowski M, Bruski Ł. Telefitting Between Kajetany and Odessa, Ukraine for Cochlear Implants. Journal of the International Society for Telemedicine and eHealth. 2019;7 (doi:10.29086/JISfTeH.7.e17).
16. Hojouj MI, Bondarenko N, Zavizion V, Procach A, Hojouj T, Elhaj M. Using Telemedicine for Providing Supportive and Palliative Care Patients with Advanced Cancer During The COVID-19 Pandemic in Ukraine. Research and Reviews on Healthcare: Open Access Journal. 2021;6(1):572-4 (doi:10.32474/RRHOAJ.2021.06.000230).
17. Tsvyakh AI, Hospodarskyy AY, Marchenkova NO, et al. Telerehabilitation of the Knee Joints of Patients with Polytrauma. Wiadomości Lekarskie. 2021;74(1):48-51 (doi:10.36740/WLek202101109).
18. Burianov OA, Yarmolyuk YO, Omelchenko TM, Lyanskorunsky VM, Vakulych MV. Telemedicine Step-Wise Consultation of a Patient with Multiple Gunshot Fractures of the Long Bones in Recovery Treatment System: A Case Report. Telehealth and Medicine Today. 2020;5 (doi:10.30953/tmt.v5.184).
19. Ministry of health of Ukraine. Ukrainians can get a free medical consultation through the contact center of the Ministry of Health [Internet]. https://moz.gov.ua/article/news/ukrainci-mozhut-otrimati-bezkoshtovnu-medichnu-konsultaciju-cherez-kontakt-centr-moz-. (Accessed 05.09.2022).
20. Alrifai A, Alyousef T, Fanari Z. Tele-Cardiology in the Syrian War. J Am Coll Cardiol. 2018;71(6):698-9 (doi:10.1016/j.jacc.2018.01.001).
21. Doarn CR, Latifi R, Poropatich RK, et al. Development and Validation of Telemedicine for Disaster Response: The North Atlantic Treaty Organization Multinational System. Telemed J E Health. 2018;24(9):657-68 (doi:10.1089/tmj.2017.0237).
22. Patel SY, Mehrotra A, Huskamp HA, Uscher-Pines L, Ganguli I, Barnett ML. Variation In Telemedicine Use And Outpatient Care During The COVID-19 Pandemic In The United States. Health Aff (Millwood). 2021;40(2):349-58 (doi:10.1377/hlthaff.2020.01786).
23. Shaw SE, Hughes G, Wherton J, et al. Achieving Spread, Scale Up and Sustainability of Video Consulting Services During the COVID-19 Pandemic? Findings From a Comparative Case Study of Policy Implementation in England, Wales, Scotland and Northern Ireland. Front Digit Health. 2021;3:754319 (doi:10.3389/fdgth.2021.754319).

24. British Medical Association. COVID-19 tracker survey wave 5 [Internet]. https://www.bma.org.uk/media/3207/bma-covid-19-tracker-survey-28-may-2020.pdf. (Accessed 05.09.2022).
25. Data Privacy Reform in Ukraine: What's New? - Connect On Tech [Internet]. https://www.connectontech.com/data-privacy-reform-in-ukraine-whats-new/. (Accessed 05.09.2022).
26. Haleem A, Javaid M, Singh RP, Suman R. Telemedicine for healthcare: Capabilities, features, barriers, and applications. Sens Int. 2021;2:100117 (doi:10.1016/j.sintl.2021.100117).
27. Liu J, Liu S, Zheng T, Bi Y. Physicians' Perspectives of Telemedicine During the COVID-19 Pandemic in China: Qualitative Survey Study. JMIR Med Inform. 2021;9(6):e26463 (doi:10.2196/26463).
28. IOM and USAID Improve Living Conditions of Displaced Persons in Vinnytsia Region | IOM Ukraine [Internet]. https://ukraine.iom.int/news/iom-and-usaid-improve-living-conditions-displaced-persons-vinnytsia-region. (Accessed 05.09.2022).
29. Ukraine war: 23 killed in Russian rocket attack on Vinnytsia - BBC News [Internet]. https://www.bbc.com/news/world-europe-62163071. (Accessed 05.09.2022).