

CASE STUDY

Rapid Deployment of Telehealth in a Conflict Zone: Supporting the Humanitarian Needs in Ukraine

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Health Tech Without Borders (HTWB) was created to support local communities affected by sudden humanitarian emergencies using digital health tools while remaining nonsectarian and apolitical. Born out of the need for a coordinated medical response to the Russia-Ukraine conflict, the initial founders of and advisors to HTWB included a group of digital health, telehealth, disaster response, and medical experts that organized to address the rapidly evolving humanitarian needs. By September 14, 2022, HTWB had supported more than 62,806 telehealth visits, and the effort continues. More than 700 volunteers, including clinicians and nonclinicians, from around the world support the effort to provide telehealth care to the people affected by the war. Telehealth solutions offer many advantages over traditional medical care in global health in terms of accessibility, health equity, efficiency, cost-effectiveness, safety, and scalability. The HTWB initiative demonstrates how telehealth can be rapidly deployed in an international disaster response situation and offers a model that could be adapted in support of other crises and humanitarian response efforts.

KEY TAKEAWAYS

- » Health Tech Without Borders demonstrates the ability to deploy fast emergency telehealth solutions in wartime conditions.
- » The call to action in critical situations can attract a significant number of diverse clinician volunteers from around the globe.

- » Collaborating with local governmental and nongovernmental partners is a key component of any successful global health initiative, including telehealth.
- » Telehealth solutions should meet not only standard requirements, but also the unique and specific requirements needed for disaster implementation.
- » Telehealth deployment and onboarding processes should be organized as efficiently as possible to minimize start-up time.
- » The nature of the disaster and the country of deployment should be considered when making strategic decisions.

The Challenge

There have been devastating human costs since the start of the Russia–Ukraine war on February 24, 2022. Through December 18, 2022, the Office of the United Nations High Commissioner for Human Rights (OHCHR) confirmed 17,595 civilian casualties in Ukraine (6,826 killed and 10,769 injured). This includes children: 428 killed and 790 injured.¹ However, OHCHR cautions that the number of civilian casualties is likely much higher, given that the collection and verification of information can be delayed in some conflict locations. Most casualties are caused by explosive weapons with wide area effects, including shelling from heavy artillery, multiple launch rocket systems, missiles, and air strikes; additional casualties result from mines and the explosive remnants of war.¹ Furthermore, the Ukrainian health care system has been devastated by attacks on hospitals and pharmacies. Many other medical facilities have closed because of a lack of supplies or power.² Access to health care, especially in conflict-affected areas, has become difficult to provide.

The Goal

Our dual-focused priority was to help the Ukrainian health care system cope with the difficulty in accessing medical care by providing free access to urgent primary care and high-quality psychological support directly to patients and clinical colleagues via telehealth platforms.

The Execution

Upon news of the invasion by the Russian Federation on February 24, 2022, the founders decided to come together to facilitate execution of these goals; [Health Tech Without Borders](#) (HTWB) was formed on February 26, 2022, as a small group of volunteers with professional expertise in digital health, telehealth, disaster response, and medical care. In June 2022, understanding that the crisis would be long term and that there were other humanitarian needs across the globe, the founders decided to incorporate HTWB as a nonprofit both in Switzerland and in the United States. (Indeed, since then, we have also started supporting humanitarian efforts in Iraq, Mexico, and Pakistan, with plans to support similar efforts in other disaster zones across the world.)

Implementing telehealth in humanitarian crises and war conditions has unique challenges, each of which would be considered in the execution of the initiative.

- **Time pressure:** The telehealth solution must deploy as quickly as possible.
- **Location of deployment:** Telehealth must be implemented in various crisis-zone settings — from isolated areas with little or no infrastructure to large urban centers. In addition, global locations for the volunteer providers must be established, with connectivity to the telehealth platforms that will be used to communicate with patients and clinical colleagues in the war zone.
- **Partnership with local agencies:** Coordination and collaboration with local agencies and health officials, including the Ministry of Health, are required, especially to ensure compliance with local digital health laws, licensure, and credentialing.
- **Local buy-in and ownership:** The local population must adopt the telehealth solution to ensure success. Strong partners on the ground who can promote the telehealth solution within the local community and build trust are vital.
- **Digital outreach:** Patients and clinicians must be aware of existing telehealth services through effective digital community organizing.
- **Security and safety:** The telehealth solution must be secure and safe for both providers and patients; it should be prepared to withstand military-grade cyberattacks, power outages, and damage to physical infrastructures, including the Internet.
- **Cultural sensitivity:** Telehealth providers should be aware of and adaptable to the local context, language barriers, and varying literacy and technological sophistication levels.
- **Usability:** The telehealth solution must be easy to use, work in low-bandwidth situations, and include the ability to connect by text, audio, and video.
- **Flexibility:** The telehealth solution and teams must be agile to adapt to the changing needs of the crisis and the evolving capabilities of the local health care workforce.

To meet these challenges, we implemented a three-phase process, each with its own components (Figure 1).

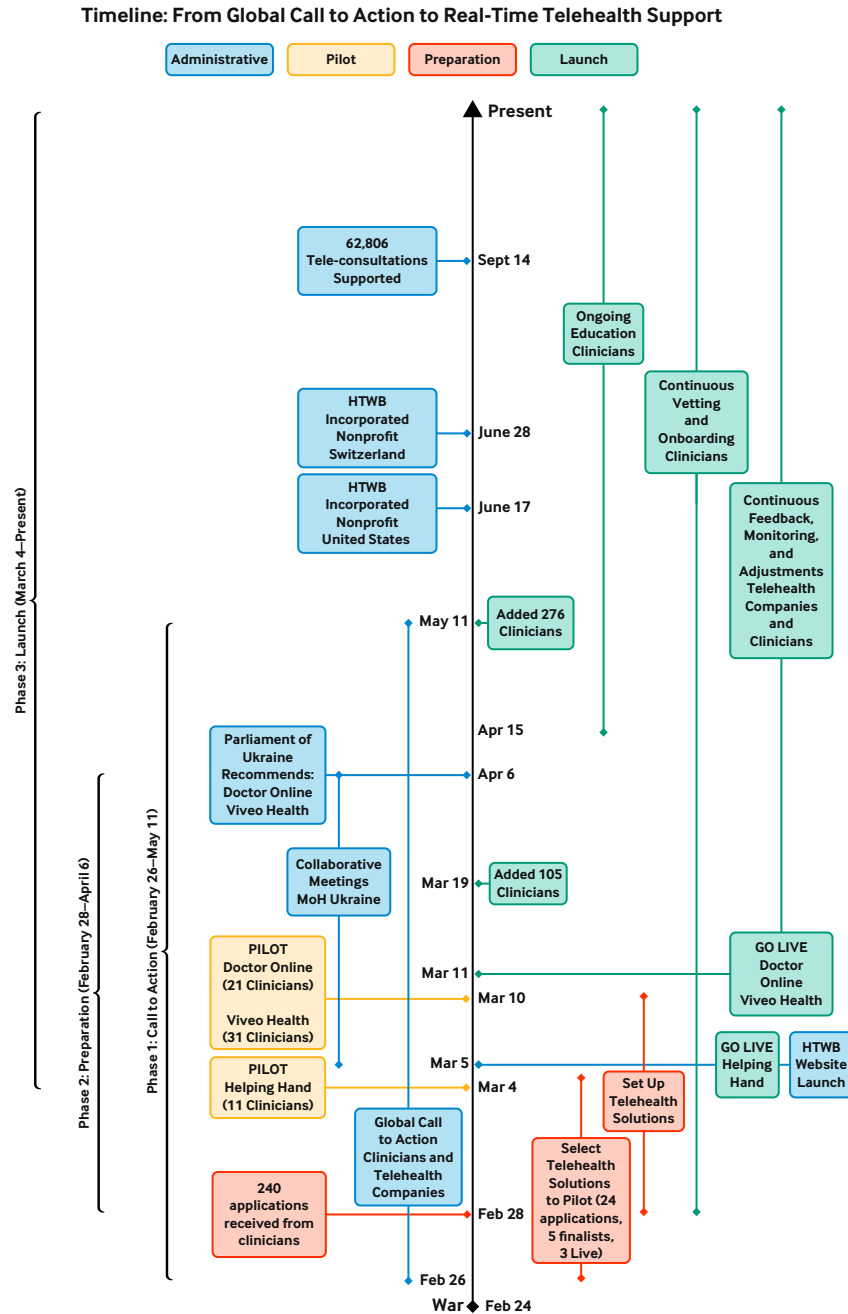
Phase 1. Call to Action (February 26–May 11, 2022)

On the third day of conflict, February 26, 2022, we launched a global call to action, “*Call for clinicians and telehealth providers*,” on social media channels (LinkedIn, Twitter, Telegram, and Facebook).

FIGURE 1

Timeline: From Global Call to Action to Real-Time Telehealth Support

This figure shows the overlapping phases of implementing a telehealth support program from global call to action to real-time telehealth support for the humanitarian crisis resulting from the conflict in Ukraine.



HTWB = Health Tech Without Borders, MoH = Ministry of Health.

Source: The authors

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The aim was to reach both Ukrainian- and Russian-speaking clinicians and telehealth platform companies. We directed clinicians and telehealth companies to an automated [registration form](#) on our website to volunteer ([Appendix](#)).

“ Demo sessions were critical to evaluate how telehealth solutions fit the need.”

The call to action attracted many volunteers from around the globe, from various medical specialties and with many languages and cultural backgrounds. Within 2 days (February 28, 2022), we received an overwhelming number of volunteers, including 240 clinicians. By March 19, 2022, 345 clinicians and psychologists had volunteered. [Doximity](#), a professional medical network for health care professionals in the United States, joined us in April and sent another 276 U.S.-based clinicians to our roster by May 11, 2022. In total, we had 577 clinical volunteers from 20 countries, 54.6% speaking either Ukrainian or Russian (Table 1). Similarly, 24 telemedicine companies and 89 nonclinical volunteers responded.

Phase 2. Preparation (February 28–April 6, 2022)

Next, we prepared to launch telehealth services in Ukraine. This process included four main steps.

Step 1. Selecting Telehealth Platforms

We selected five telehealth platforms from the telehealth company respondents that met the requirements for use in this crisis. To choose these five, we used a rapidly created prioritization matrix that considered high-priority and medium-priority parameters (Table 2).

Table 1. Call to Action Responses: Volunteer Pool as of May 11, 2022

| Role | Number of Volunteers | Number of Countries | Ukrainian or Russian Language, No. (%) | Comment |
|---|----------------------|---------------------|--|--|
| Clinician Volunteers (all respondents) | 621 | 20 | 329 (53.0) | <ul style="list-style-type: none"> • 240 individual volunteers responded within 2 days of the call to action (February 28, 2022). • By March 19, 2022, 345 volunteers had responded to the call to action. • This includes both individual and Doximity volunteers. • Volunteers were from the United States, Finland, and Portugal, among others. |
| Clinician Volunteers (vetted and onboarded) | 577 | 20 | 315 (54.6) | Of the 345 who had responded by March 19, 2022, 301 were ultimately vetted and onboarded. |
| Nonclinical Volunteers | 89 | 21 | 15 (16.9) | This number grossly underestimates the volunteers operationally supporting HTWB. Many of our volunteers are not officially registered through our website and in our database. We estimate there are approximately 150 nonclinical volunteers. |

HTWB = Health Tech Without Borders. Source: The authors

Table 2. Prioritization Matrix for Evaluating Telehealth Companies

| |
|---|
| <p>High-priority requirements*</p> <ul style="list-style-type: none"> • Ability to rapidly deploy a solution • HIPAA compliance for the United States; GDPR compliance for the European Union • Fast language localization (Ukrainian and Russian) within 1 week • Simplified user interfaces for both clinicians and patients • Multiple modalities to connect, including text, audio, and video-based visits • Intake and visit summary forms • Scalability: opportunity to increase capacity for both clinicians and patients • Cybersecurity requirements (e.g., VPN) • Device agnostic |
| <p>Medium-priority requirements**</p> <ul style="list-style-type: none"> • Data center (cloud hosted, private cloud, or on premises) • Electronic scheduling with a reminder system • Interoperability • User authentication and authorization processes (e.g., platform log-in) • Mobile application • Simultaneous visits for a single provider • Dashboards, analytics, and reports • Image and file uploads • E-prescribing • Local presence and face validity • Existing network of patients in Ukraine |

HIPAA = Health Insurance Portability and Accountability Act of 1996, GDPR = General Data Protection Regulation, VPN = virtual private network. *High priority: each of these requirements must be met; the absence of any one is disqualifying. **Medium priority: each of these requirements is desired, but the absence of one or more is not disqualifying. Source: The authors

HTWB conducted multiple demo sessions with the telehealth companies to understand each solution’s core details, functionalities, size, and ability to be localized in Ukraine. Demo sessions were critical to evaluate how telehealth solutions fit the need. On the basis of these discussions, demos, and the priority matrix, we selected five best-fit telemedicine companies to pilot. Because of the urgency and short timetable, we ultimately went live with three of the companies: [Doctor Online](#), [Viveo Health](#), and [Helping Hand](#).

Step 2. Technical Implementation

Next, we worked on setting up the platforms. We supported localization of the telehealth platforms in English, Ukrainian, and Russian and provided translation when needed. We also collaborated with partners to simplify the user interfaces to accommodate patients and clinicians with different levels of digital literacy and cultural backgrounds. We worked with the telehealth companies to develop the minimum viable product for launch. This required regular calls and discussions with the telehealth companies to streamline and modify their solutions and workflows. For example, we worked with one company to simplify their registration process to ensure rapid patient enrollment.

“ *We collaborated with the Ukrainian Ministry of Health to ensure all of our volunteers had the required licensing and credentialing requirements.* ”

Step 3. Administrative Implementation

First, we collaborated with the Ukrainian [Ministry of Health](#) to ensure that all of our volunteers had the required licensing and credentialing requirements. Next, we created an administrative safeguard process for clinician volunteers to confirm credentialing. Volunteers completed an [online application form](#) with their general information and professional credentials ([Appendix](#)). Credentials were verified via online licensing databases and by requesting additional documents and certificates. For example, in the United States, we used the American Board of Medical Specialties website [Certification Matters](#), and similarly, we used the Finnish [equivalent](#). In some cases, we conducted video interviews with the clinician volunteer. We created profiles for each clinician volunteer in our database and asked for permission to share their data with the telehealth companies. The individual companies again vetted and verified each clinician during onboarding. Volunteers were not constrained to one platform, and many volunteered with multiple platforms.

Step 4. Training Clinical Volunteers

The onboarding process for telehealth platforms was simple, fast, and individualized and included:

- Detailed text and video instructions for the telehealth systems in English, Ukrainian, and Russian
- 24-7 service support and technical support
- Online training on how to work with patients from war zones, patients with mental health issues, and those with different levels of trauma
- Peer-to-peer support for psychologists who work with victims of assault and war

To secure proper onboarding, education, and support, we partnered with [Curated.Health](#) — a social network in which volunteers could ask questions, give feedback, and support each other. We created three separate Curated.Health spaces for discussion: (1) clinical volunteers; (2) telehealth companies; and (3) general, nonclinical volunteers. Each space had assigned champions responsible for answering questions and resolving issues in real time. Finally, we discussed legal liability, malpractice concerns, and medication prescribing with telehealth platform providers and volunteers. Knowing that the chance of liability and malpractice in a war zone is minimal, malpractice and liability concerns were most prevalent among our U.S.-based volunteers. We were not able to address individual liability and malpractice concerns and instead had them reach out to their personal malpractice and risk management carriers.

Phase 3. Launch (March 4, 2022–Present)

We launched the telehealth platforms in Ukraine first as a pilot (soft launch) on March 4, 2022, by onboarding 11 clinical volunteers, and then as a full-fledged service (formal launch) with a

go-live date of March 5, 2022, with Helping Hand. Soon after, we did a similar pilot with Doctor Online and Viveo Health on March 10, 2022, and carried out a formal launch on March 11, 2022.

“ We must be mindful that certain data that are routinely gathered during peacetime can easily lead to unexpected, life-threatening, and deadly consequences.”

Step 1. Go Live

After rapid, successful pilots, we offered telehealth across Ukraine via our partners and volunteers. Our pilot was focused on ensuring smooth onboarding of vetted, clinical volunteers to the platforms. Because of the time pressure, our pilot phase was only 1 day for each platform. All of the teams understood the mission and cause and moved extremely rapidly to ensure a quick start in Ukraine’s unique, war-torn environment. We prepared leaflets with quick response codes linked to telehealth platforms’ registration forms and distributed them in refugee camps and through local nongovernmental organizations (NGOs). We also used websites, social media pages (LinkedIn, Twitter, Facebook, and Google), chats, and messengers (Telegram and WhatsApp). The [Ukraine Telehealth Relief](#) initiative received support from multiple groups, including the Healthcare Information and Management Systems Society ([HIMSS](#)), the Massachusetts General Hospital [Center for Global Health](#), the European Connected Health Alliance Group ([ECHAlliance](#)), and the Parliament of Ukraine ([Verkhovna Rada](#)). Verkhovna Rada [recommended](#) two of our platforms to Ukrainian clinicians and patients on April 6, 2022: Doctor Online and Viveo Health.

Step 2. Support and Retention

We initially received high-level usage statistics mostly on a weekly basis. Because all teams, including HTWB, were offering in-kind support, reporting was kept to a minimum and included only the high-level numbers of completed consultations. This was spaced out quickly and is now ad hoc because of resource constraints.

HTWB provided support to clinicians via Curated.Health, including onboarding support, scheduling support, sharing of good practices and first experiences, education on how to use telehealth platforms, and peer-to-peer support. For long-term retention, HTWB launched [a series of educational webinars](#) with experts in different fields to share experiences in mental health, rehabilitation, telehealth, and working with vulnerable populations. We held webinars in English and Ukrainian. In total, more than 2,000 attendees joined our webinars, with each having sometimes more than 100 participants.

Step 3. Continuous Feedback, Improvement, and Expansion

Since the start of this endeavor, we continue to have open lines of communication and information sharing between our partners and the HTWB leadership. We continue to adapt on the basis of the

needs of our partners. For example, our partners share with us when they are the focus of cyberattacks, and our volunteers give us feedback on consultation volume.

Although we present our process in succinct, individual steps and phases, the reality of how this program came together was that all of the discussions, meetings, vetting and onboarding of volunteers, and operationalizing of the telehealth companies happened synchronously. Because of the dynamic situation in Ukraine, there were constant feedback cycles that required all parties to rapidly adjust and pivot. Furthermore, we continuously explored and integrated new digital health technology partners, including recent collaborations with [VSee](#) and [Butterfly Network](#).

“ *Supply and demand mismatch led to some volunteers staffing short periods when consultation volume was low, leading to dissatisfaction on the part of all parties.* ”

Hurdles

Special Considerations in a Conflict Zone

War affects societies in all dimensions from sociopolitical to economic, including infrastructure that limits virtual care delivery. Hundreds of different organizations supporting victims of this war have experienced cyberattacks.³ These cyberattacks have increased personal risk for volunteers, including the HTWB team, despite its having stayed apolitical. We attempted to thoughtfully protect the personal information of patients and volunteers. Cybersecurity should be considered the highest priority in any technological project in war zones.

As technical and medical professionals trying to support health care in a war-torn disaster arena, we must be mindful that certain data that are routinely gathered during peacetime can easily lead to unexpected, life-threatening, and deadly consequences. For example, the geolocation of patients, ambulances, hospitals, and health care infrastructure allow for geographic targeting. Similarly, diagnostic data, injury patterns, and patient volume could unintentionally provide important strategic and tactical information.

Furthermore, as war causes constraints and interruptions in electricity, it directly influences Internet access. People also spend much time in bomb shelters, where an Internet connection may be weak and unreliable. As a result, most of the consultations inside Ukraine were in text-based, asynchronous format (Table 3).

Time Pressure and Urgency

Because of the time pressure and urgency, our team worked rapidly and had to make quick decisions, which normally would take at least weeks, sometimes months, to make. For example, vetting and modifying the telehealth platforms for specific use cases usually require multiple demonstrations, discussions, and time to ensure a good fit. Because of the incredible dedication

Table 3. Connection Type of the Telehealth Visits, March 4, 2022, to September 14, 2022

| Visit Type | Number | Percent | Comment |
|------------|--------|---------|---|
| Video | 189 | 0.3 | |
| Audio Only | 607 | 1.0 | |
| Text Only | 61,010 | 98.7 | Most of the consultations were text based. Patients and clinicians can send images as well. These consultations were behind the telehealth platform's firewall and required Internet service. Regular SMS was not used. |

SMS = short messaging service. Source: The authors

of our technology partners, we were able to meet and modify their platforms in a short period, which is uncharacteristic without the urgency.

In future emergency scenarios, the onboarding process can be launched rapidly with standardized data elements, giving volunteers enhanced training on the telehealth platforms, and matching of resources to demand using algorithmic technologies.

Virtual and Global Volunteers

The overwhelming support from our global volunteers gave us the engine to move forward. Similar to organ transplantation allocation, supply and demand mismatch led to some volunteers staffing short periods when consultation volume was low, leading to dissatisfaction on the part of all parties. For example, some volunteers would join after regular business hours in the United States, but unfortunately this was during low-volume times, as most Ukrainians were asleep. Similarly, the Ukrainian population had to shelter regularly in bunkers, and even if a volunteer joined during a peak time, they might not know that the conditions on the ground were leading to a low volume of consultations.

Importance of Local Partnerships

Most of the telehealth consultations were with our local, Ukrainian-based telehealth partner, Doctor Online. In hindsight, this made sense because of the active cyberwarfare and a heightened distrust of novel technologies and smartphone applications; many Ukrainians were probably wary of joining a new, unknown telehealth platform. As such, Doctor Online, a known entity within Ukraine, provided essentially all of the consults. As a result, Viveo Health transferred their Ukraine work to Doctor Online as of August 1, 2022. This underscores the need to collaborate with a locally recognized and trusted partner to ensure success.

“*Because the text-only feature allowed for longitudinal discussions between the clinician and the patient, Ukrainians were able to continue their conversations with their clinician asynchronously despite regular Internet outages and moving in and out of bomb shelters.*”

Patient Demographics/Social Determinants of Health

Patient demographics in war-torn Ukraine significantly differ from the distribution we would see in the United States or the European Union. For example, Ukrainian patients have higher rates of comorbidities and lower rates of vaccinations compared with those of the European Union. Most refugees are women, children, and some elderly because of restrictions preventing men from leaving Ukraine.⁴ The language barrier is a significant factor limiting telehealth delivery from external clinicians, because 97% of Ukrainians speak Russian (29.6%) or Ukrainian (67.5%) as their primary language.⁵ Understandably, some of the population refuses to speak Russian.⁶

The Team

Our core team that coordinates, monitors, and organizes HTWB includes Ukrainian partners, two physician leaders with telemedicine experience (one with mass media expertise), a telemedicine technical and operational expert, and a strategic planning and business expert. Beyond the core team, we recruited advisors with expertise in clinical specialties (e.g., mental health), health technology, digital health, international relations, and communications. Additionally, we worked with the Ukrainian government, multiple other NGOs, and Ukrainian technology and clinical partners.

Metrics

Metrics and outcomes are challenging to collect in humanitarian disasters, especially with a tactical focus on becoming operational. Furthermore, data gathering can be challenging because we rely on our partner telemedicine companies, in which many data points may not be available.

Understanding these challenges, we tracked some high-level numbers. First, we had 345 individual clinician volunteers (301 vetted and onboarded) respond to the initial call to action, and another 276 (all vetted and onboarded) joined through Doximity. Second, once telemedicine services were active, we tracked the total number of consults completed starting from our go-live date of March 4, 2022. As of September 14, 2022, we had supported 62,806 total consults by augmenting the volunteer staff of the telemedicine platforms we engaged. For safety reasons and ease of use, demographic data were not required upon registration by the patient, and, therefore, we do not have a complete data set of age or gender. However, we have data on the final diagnoses as set by the clinician; most of the visits were for general or preventive care (Table 4).

Examples of visits included offering advice to the family of a child with a fever or caring for a patient with an uncomplicated upper respiratory infection. Most of these visits were primary care related, most likely because the population cannot access health care easily, either because it has been destroyed or because it is unavailable as the hospitals care for war casualties.

Of the 19,357 telemedicine encounters with age recorded, 94.0% were with patients between the ages of 18 and 44, and of the 18,174 that reported gender, 66.8% were female. Nearly all (98.7%)

Table 4. Diagnostic Categories of Telehealth Visits, March 4, 2022, to September 14, 2022

| Diagnostic Group | Number of Visits | Percent of Visits | Comment |
|---------------------------------|------------------|-------------------|---|
| General Care and Prevention | 26,604 | 42.4 | This shows the unequivocal need for access to general and primary medical care when living under war or disaster conditions. |
| Infectious Disease | 12,234 | 19.5 | |
| Pediatrics | 4,150 | 6.6 | The number of pediatric cases is likely grossly underestimated because many of the other diagnoses could be for children. Age data were not collected for all patients. |
| Dermatologic | 3,355 | 5.3 | |
| Neurological | 3,316 | 5.3 | |
| Psychological | 2,827 | 4.5 | |
| Gastrointestinal | 2,572 | 4.1 | |
| Pregnancy | 2,472 | 3.9 | |
| Ears/Nose/Throat and Dental | 1,096 | 1.7 | |
| Gynecological | 793 | 1.3 | |
| Musculoskeletal | 740 | 1.2 | |
| Cardiovascular | 419 | 0.7 | |
| Endocrine | 387 | 0.6 | |
| Trauma | 129 | 0.2 | |
| All Other Diagnostic Categories | 1,712 | 2.7 | |
| Total | 62,806 | 100.0 | |

Source: The authors

of the consults were text only (Table 3). The text-only consultations were completed within the secure, Health Insurance Portability and Accountability Act of 1996 (HIPAA)/General Data Protection Regulation (GDPR)-compliant telehealth platform and not by standard short messaging service (SMS) networks. Standard SMS texting is unreliable and not secure⁷ and can be easily intercepted or sent to the wrong recipient. In addition, the use of standard SMS messages makes it challenging to comply with HIPAA and GDPR regulations because the messages are not logged reliably with an audit trail.^{8,9} Texting through the telehealth platform required access to the Internet; however, the text-only feature allowed for longitudinal discussions between the clinician and the patient, and this allowed Ukrainians to continue their conversations with their clinician asynchronously despite regular Internet outages and moving in and out of bomb shelters. Interestingly, the text-based consultations also allowed clinicians to conduct multiple consultations simultaneously. For example, instead of doing a synchronous 30-minute video telehealth visit, that same clinician could potentially communicate and complete multiple telehealth visits at once during that 30-minute window.

Where to Start

To start a telemedicine project to provide support in humanitarian disaster zones, we recommend the following:

- Partnering with local government and health officials to work through the local technological, legislative, and regulatory challenges with telemedicine
- Partnering with telemedicine companies that fit the specific use case you are looking to support
- Finding local, in-country partners dedicated to the same mission
- Recruiting and vetting clinicians globally to scale the project

Beyond humanitarian efforts, telemedicine support could provide scalable, rapid access to health services to underserved areas and populations. This includes rural areas in the United States with inadequate access to health care. As Covid-19 has shown us, the technology we have today is not a barrier to offering health care. If telehealth can support populations in a war zone, we should be able to support patients anywhere in the world.

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Appendix

Data Dictionary for Provider Clinician Database

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