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MEDICAL SCIENCES

CHALLENGES OF TEACHING IN MEDICAL INSTITUTIONS OF UKRAINE DURING WARTIME

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Summary This article examines the major challenges currently facing medical education in Ukraine and how medical schools are attempting to adapt and continue training activities. The main challenges discussed include physical disruption and damage to facilities, loss of staff and students, lack of resources and supplies, difficulties providing practical clinical training, psychological impacts on learners, and uncertainty about the future. While the resilience and motivation of those running medical schools under fire is admirable, sustaining education amidst constant threats to infrastructure and people remains a monumental task.

The ongoing war in Ukraine has created immense challenges for the country's medical education system. With many parts of Ukraine under attack, medical schools and teaching hospitals have struggled to continue operating and training the next generation of healthcare professionals.

Prior to the war, Ukraine had a well-developed medical education infrastructure with numerous medical universities and postgraduate teaching institutions. The quality of medical training was quite high. However, the Russian invasion that began in February 2022 has severely disrupted this system. Some

medical training institutions have been forced to relocate and some teachers and students have left the country. Ensuring continuity of instruction and practical training under wartime conditions has proven extremely difficult.

The targeting of hospitals and infrastructure across Ukraine has directly impacted medical teaching facilities. This physical destruction as well as frequent air raid alerts forces institutions to attempt to continue teaching and providing practical clinical training in makeshift underground locations lacking proper equipment. Resources that would normally be readily available for instructing medical students such as anatomy models, microscopes, medical textbooks, computers, etc. are often scarce or non-existent in bunkers and basements. Simulation training is also much more difficult without proper facilities. The patchwork nature of instruction under these conditions severely impacts educational quality.

The outflow of both students and teachers from Ukraine's medical schools further strains the system. Many professors and doctors have left conflict zones for safety, leaving teacher shortages. Multiple schools report loss of around 30-40% of their academic staff. Younger trainees and students have also exited Ukraine in droves. This "brain drain" halves the student census at some institutions, leaving lecture halls empty.

For teachers who remain, challenges persist in providing meaningful instruction when students are so dispersed. Some schools have continued teaching virtually to reach students spread across multiple countries, but this is resource-intensive. The loss of so many teachers and students ruptures an educational system predicated on intensive face-to-face interaction. Both teachers and student bodies will take time to regrow post-war, negatively impacting medical education in the interim.

The realities of war also affect medical schools' abilities to access the inputs for high-quality education, like electricity, laboratory equipment, and learning materials. Power outages are common in conflict areas, making consistent virtual instruction difficult. Medical supplies for teaching labs are in short supply or prohibitively expensive due to disruption of supply chains. Inventory is further depleted by the needs of treating war casualties. Textbooks and learning materials are

also scarce as access to printers and publishers is constrained.

These shortfalls force instructors to improvise second-rate simulations and assignments. However, there is no adequate replacement for robust hands-on training and resources when teaching future healthcare professionals. Shortages across the board undermine medical education.

Perhaps one of the biggest challenges is attempting to provide practical clinical training for medical students when hospitals lie in ruins and war rages. This critical experiential learning, which allows students to apply knowledge in a clinical setting, is incredibly difficult to recreate online or in makeshift underground facilities. Even in areas less affected by active fighting, many hospitals are overwhelmed by war casualties and have no capacity to host students for training.

Some universities have negotiated placements for students in hospitals in quieter western regions of Ukraine or even abroad in Europe. However, these options are limited, and most students receive only a fraction of their needed hands-on training. This will leave major gaps in experience and may produce medical graduates unprepared to practice in critical areas like emergency medicine and trauma surgery. A whole generation of students risks entering the healthcare field without adequate practical competencies. In addition to the tangible impacts on infrastructure and resources, the immense stress of studying medicine in a war zone takes a psychological toll on students. Having to relocate to makeshift bunkers, worry for the safety of loved ones, and witness death and destruction firsthand leads to significant mental health issues for learners. Studies find high rates of depression, anxiety, and post-traumatic stress among Ukrainian medical students. This mental distress makes focusing on studies extremely difficult.

Faculty members also describe the grief and trauma of teaching in these circumstances while trying to maintain a sense of normalcy. The impact on the psyche of learning and working in an active war zone further drains the energy and motivation of students and staff. Healing these psychological scars and providing adequate mental health support will be crucial for rebuilding the medical education system in Ukraine long-term. Finally, pervasive uncertainty about the future hangs

over medical learning in Ukraine. Administrators do not know if facilities will exist from one day to the next, whether students will return, what the postwar healthcare system may look like, and how Ukraine will rebuild its medical education infrastructure. This makes even short-term planning nearly impossible. Students also face unease over job prospects upon graduating. Despite these uncertainties, teaching continues out of sheer determination and necessity. The country will desperately need trained physicians and other healthcare professionals during reconstruction. But until the war ends, the way forward for medical education in Ukraine will remain clouded, requiring creative adaptation in the meantime. The system persists, however precariously, in hopes of brighter days ahead.

Conclusions The Russian invasion has profoundly disrupted Ukraine's medical education system and thrown massive challenges at the country's medical schools. From damaged facilities to loss of personnel to shortages of supplies, few aspects of teaching have been left unaffected. Perhaps most critically, students face huge barriers obtaining quality practical clinical training. Mental distress among learners and teachers further strains the process.

While the resilience shown by universities striving to continue instruction despite bombardments is remarkable, makeshift medical education pales compared to pre-war standards. The true impacts on educational quality remain to be seen, but will likely be significant. Recovery and rebuilding will be a long process requiring extensive international support.

For Ukraine's medical learners and educators, each day of teaching under wartime conditions demonstrates remarkable courage and determination. Their efforts highlight the vital role of doctors, nurses, and healthcare professionals for any society, particularly amidst conflict. By continuing to pass on knowledge and skills while under fire, Ukraine's medical schools represent hope for the future.