REVIEW ARTICLE

Postgraduate medical education in Ukraine: Addressing modern challenges

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ABSTRACT

Aim: To synthesize the principles of distance learning for medical professionals based on a review of the literature and the authors' own experience, and to identify optimal algorithms and tools for the online training of physicians during the war in Ukraine.

Materials and Methods: The authors' experience in delivering distance education to physicians was systematized and summarized. The literature analysis was conducted using PubMed, Google Scholar, Web of Science, and Scopus databases, regulatory legal acts and practical experience of training physicians in wartime conditions. The newest publications up to 5 years old or the most thorough publications that vividly described the essence of the topic were chose. When searching for information on the features of the current educational platforms used in PGME we used the following combinations of keywords: "distance education", "postgraduate medical education", "modern challenges", "war in Ukraine". 32 sources were selected that fully corresponded to the results of the request.

Conclusions: Modern technologies have significantly transformed the system of postgraduate medical education (PGME). The challenges of war, pandemic, and other global crises have underscored the necessity for the widespread and effective use of digital tools. Analysis indicates that distance learning technologies represent a vital solution for maintaining the quality of PGME. However, their successful implementation requires addressing technical, organizational, and methodological challenges. A comprehensive approach is essential, involving the development of new standards for distance learning, upgrades to technical infrastructure, and the active collaboration of all stakeholders. Utilizing widely adopted, reliable, and accessible information and communication technologies (ICT) in the pedagogical process enables the successful overcoming of contemporary challenges in medical education. The rapid adaptation of both instructors and medical trainees to new modes of knowledge acquisition helps maintain high teaching standards, ensures stability and continuity of training, and facilitates effective feedback.

KEY WORDS: distance education, war in Ukraine, postgraduate medical education, modern challenges

Wiad Lek. 2025;78(12):2823-2829. doi: 10.36740/WLek/214417 DOI

INTRODUCTION

The relevance of this study is driven by profound changes in Ukraine's healthcare system, resulting from ongoing reforms, the COVID-19 pandemic, and, most significantly, the war. These factors necessitate corresponding adaptations in postgraduate medical education (PGME). Current realities require medical professionals to rapidly adapt to new conditions and acquire essential knowledge and skills, including emergency response, patient care in conflict zones, and clinical management in resource-limited settings.

PGME is crucial for ensuring the professional development of healthcare workers, enhancing the quality of medical services, and enabling adaptation to the rapidly evolving healthcare landscape, especially during crises [1,2]. The challenges facing PGME in Ukraine stem from both systemic issues within the healthcare sector and external factors, including global advancements in medical science and educational technology [3].

Moreover, the military conflict has profoundly shaped the evolution of PGME in Ukraine. Wartime conditions introduce distinct challenges, such as a shortage of qualified instructors in affected areas, disrupted access to educational materials, and the critical need for flexible training solutions. In response, the expansion of distance learning technologies has become imperative [4].

This situation underscores the urgent need to modernize the PGME system by integrating new educational standards that leverage digital technologies and flexible learning formats [5].

AIM

To synthesize the principles of distance learning for medical professionals based on a review of the literature and the authors' own experience, and to identify optimal algorithms and tools for the online training of physicians during the war in Ukraine.

MATERIALS AND METHODS

The authors' experience in delivering distance education to physicians was systematized and summarized. The literature analysis was conducted using PubMed, Google Scholar, Web of Science, and Scopus databases, regulatory legal acts and practical experience of training physicians in wartime conditions. The newest publications up to 5 years old or the most thorough publications that vividly described the essence of the topic were chose. When searching for information on the features of the current educational platforms used in PGME we used the following combinations of keywords: "distance education", "postgraduate medical education", "modern challenges", "war in Ukraine". 32 sources were selected that fully corresponded to the results of the request.

ETHICS

This review article is based on an analysis of publicly available scientific data published in peer-reviewed journals, clinical guidelines and databases. No patient-identifying data was used during the work, nor was there a need to obtain approval from an ethics committee, as the study did not include new clinical interventions or initial collection of patient information.

REVIEW AND DISCUSSION

Postgraduate medical education in contemporary Ukraine faces multiple challenges driven by socio-economic, political, and technological changes. These challenges necessitate the adaptation of the medical training system to meet new demands [6, 7].

The key challenges are as follows:

TRANSFORMATIONS IN HEALTHCARE

Healthcare Reform: The transition to a new model of medical service financing, exemplified by the National Health Service of Ukraine, demands that medical professionals acquire new competencies in management, communication, and strategic planning [8].

Workforce Shortage: The emigration of physicians to EU countries has led to a significant deficit of qualified specialists in Ukraine [9].

Rising Burden of Chronic Diseases: There is a growing need to train specialists in managing aging populations and the increasing prevalence of non-communicable diseases [10].

ACCESS TO MODERN KNOWLEDGE

Outdated Educational Standards: Curricula often lag behind international benchmarks, necessitating alignment with current global recommendations and clinical protocols [11].

Limited Access to Up-to-Date Resources: Many physicians lack access to the latest scientific publications, clinical guidelines, and modern educational platforms.

DIGITALIZATION OF EDUCATION

Online Learning: While the COVID-19 pandemic accelerated the adoption of distance education, limitations in technical infrastructure and insufficient faculty training often hinder the effective implementation of digital technologies [12].

Technological Literacy: Physicians must be trained to work with electronic medical records, telemedicine systems, and other digital tools essential for modern healthcare.

FINANCIAL BARRIERS

High Cost of Education: Many advanced training courses, particularly those aligned with international standards, are financially inaccessible for a significant number of physicians.

Insufficient Funding for Educational Initiatives: Public investment in medical education remains limited, restricting opportunities for professional development.

ETHICAL AND PROFESSIONAL CHALLENGES

Communication Skills: Healthcare reforms have heightened the need for medical professionals to develop strong communication skills for effective interaction with patients and colleagues.

Evidence-Based Medicine: Integrating evidence-based practices into daily clinical work remains a challenge.

Medical Errors: Legal and ethical aspects of medical errors receive insufficient attention, necessitating a greater focus on accountability and patient safety.

METHODOLOGICAL ASPECTS

Inadequate adaptation of training materials for distance learning, with limited use of interactive teaching methods.

A need for new approaches to assessing the knowledge and skills of medical professionals.

Challenges in organizing practical training in an online environment.

IMPACT OF THE WAR

Military operations in Ukraine present severe additional challenges to the healthcare system:

Staffing Shortages: The migration of healthcare workers to safer regions or abroad, coupled with combat casualties, has drastically reduced the availability of qualified specialists.

Increased Healthcare Workload: A surge in patients with combat trauma, stress-related disorders, and complications from chronic illnesses demands a highly skilled healthcare workforce.

Adapting to New Work Environments: There is an urgent need to rapidly adopt care protocols suited for resource-limited and war-torn settings.

Infrastructure Damage: The destruction of medical and educational facilities necessitates the development of alternative learning methods, such as distance and mobile learning platforms.

Security Threats: Students and faculty in conflict zones face heightened security risks.

Need for Specialized Training: Doctors, rehabilitation specialists [6], and psychologists require additional training to meet the specific demands of wartime healthcare.

Psychological Pressure: Continuous stress and the high risk of professional burnout among healthcare workers necessitate the inclusion of psychological support programs in PGME. This psychological burden on both educators and learners reduces training effectiveness.

Training in Resource-Limited Conditions: There is a critical need for training that is applicable in environments where access to resources is severely restricted.

The ongoing military conflict remains the most significant factor impacting postgraduate medical education in Ukraine [6,7]. These challenges require a comprehensive adaptation of the medical education and training system to meet new realities [13,14].

POSSIBLE SOLUTIONS

Develop a national strategy for PGME that addresses the specific challenges of wartime.

Implement hybrid training formats that integrate online learning with in-person practical sessions.

Create digital simulators and virtual laboratories to enhance hands-on training opportunities.

Enhance digital literacy among instructors and trainees through targeted educational programs.

Strengthen cybersecurity measures for online education platforms to protect sensitive data.

Support the psychological well-being of educators and learners through specialized online resources and mental health programs.

Establish financial support mechanisms for both educational institutions and learners to ensure accessibility and continuity of learning.

Improve coordination among government agencies, educational institutions, and international partners to enhance the sustainability and effectiveness of the educational process.

EDUCATIONAL PROCESS IN WARTIME CONDITIONS

The ongoing hostilities have created profound challenges for higher education, with ensuring the stability and continuity of the educational process being paramount.

Evidence indicates that the specific circumstances of conflict-affected regions have become a decisive factor for both educators and trainees [15]. The full-scale invasion, including the occupation of territories and widespread aerial bombardments, has led to the mass displacement of the population internally and abroad. Consequently, many learners, educators, and staff have been forced to relocate.

In areas under Ukrainian control, the educational process is recommended to be conducted in one of three formats: in-person, hybrid, or distance learning. The choice of format is directly linked to the ability to ensure the safety of all participants. As a result, distance learning has emerged as the predominant mode [12,16].

The introduction of martial law has led to significant adjustments across all sectors, including higher education. The substantial autonomy granted to educational institutions by the Law of Ukraine "On Higher Education" has enabled a timely and dynamic adaptation of the educational process. This flexibility was previously demonstrated during the COVID-19 pandemic, when institutions rapidly transitioned to distance or blended learning [17].

Thanks to advancements in recent years, educational institutions can now implement curricula effectively despite the challenging circumstances. Modern technology has brought substantial changes to the PGME system. The war, pandemic, and other global challenges have underscored the urgent need for the widespread and effective use of digital tools in education [18]. Under martial law, distance and blended learning have become a necessity rather than an alternative [19,20].

The IT industry responded swiftly to the needs of educators and learners by expanding network capacity and developing a wide range of digital tools. Numerous blogs offering training recommendations appeared on social media, and courses on creating educational resources and organizing online learning were launched [21].

Considering the key functions of multimedia, O. Bondarenko proposes the following classification:

Presentation: Supporting the delivery of new educational materials.

Simulation: Training learners through scenario analysis and decision-making tasks.

Control: Assessing the assimilation of educational materials.

Information and Reference: Providing essential theoretical resources for independent work [22].

Continuing Medical Education

Continuing education is essential for maintaining the professional competence of healthcare professionals. The integration of digital technologies has made continuing medical education more flexible and accessible [23,24].

ADVANTAGES OF DIGITAL EDUCATION

Flexibility and Accessibility: Healthcare professionals can learn at their convenience, integrating education with their clinical work. This is particularly crucial given unpredictable work schedules during wartime.

Continuity of Learning: Remote platforms allow education to continue safely, regardless of geographic location, which is essential during evacuations or when working in conflict zones.

Access to Educational Resources: Online platforms provide access to international databases, up-to-date clinical guidelines, and protocols, which are crucial for professional growth.

Risk Minimization: Online learning eliminates the need for in-person attendance, reducing potential threats to life and health.

Content Relevance: Digital platforms allow for the timely updating of materials to reflect the latest clinical guidelines.

Interactivity: The use of video and multimedia enhances the learning experience, improving comprehension and knowledge retention.

EXAMPLES OF INITIATIVES

Online webinars and conferences organized by international associations and leading medical universities.

Continuing education courses on platforms such as Coursera, Udemy, and specialized medical portals.

Mobile applications for regular updates to medical knowledge (e.g., Medscape, UpToDate).

Participation in online conferences and congresses to stay abreast of global medical developments.

PROBLEMS AND CHALLENGES

Technical Barriers: A stable internet connection and modern equipment are essential prerequisites.

Motivation: Self-directed learning demands a high level of discipline and personal responsibility.

Financial Constraints: The cost of many platforms and courses can be prohibitive, limiting accessibility.

Thus, while digital technologies offer significant opportunities, their effective implementation requires careful planning and support at the state level [25-27].

Despite its advantages, distance education cannot fully guarantee stability and continuity under wartime conditions.

The main risks include:

Limited internet access due to infrastructure damage.

Frequent power outages.

Interruptions from air raids requiring movement to shelters.

Lack of computer access for some learners.

Urgent evacuations from active combat zones.

In these circumstances, the feasibility of remote learning depends primarily on internet availability, which remains stable in most areas not directly affected by active hostilities. This approach helps preserve human resources, maintain communication, and, most importantly, ensure the safety of all participants [15].

TOOLS FOR ORGANIZING DISTANCE AND ONLINE LEARNING

The most popular educational platforms include:

Moodle

Advantages: Flexible course customization, support for various learning formats, robust assessment tools.

Disadvantages: Steep learning curve for non-technical users; requires a stable internet connection.

Google Classroom

Advantages: User-friendly interface, seamless integration with Google services, mobile compatibility.

Disadvantages: Limited functionality for organizing complex medical training and practical sessions.

Microsoft Teams

Advantages: Supports video conferencing, document collaboration, and interactive tools for group work.

Disadvantages: Requires a license for full functionality; can be resource-intensive.

Zoom

Advantages: Stable connection, accessible interface, supports large groups, includes recording and polling features.

Disadvantages: Limited functionality in the free version; potential data security concerns; requires a stable connection.

Coursera and EdX

Advantages: Access to courses from leading global universities; certification options; extensive course selection.

Disadvantages: High costs for individual users; limited adaptation to Ukrainian educational standards [28,29].

Webinar-oriented platforms have become essential. The authors selected Zoom for its simplicity, accessibility, and reliability. Its widespread use within the medical community also reduces the learning curve for participants. During sessions, instructors can pause every 20-30 minutes to gather feedback via the chat function, allowing them to adjust the pace and structure of the presentation to maintain audience engagement.

PRESENTATION AS A TOOL FOR VISUALIZATION IN ONLINE EDUCATION

In time-limited educational sessions, the primary goal is to explain key concepts clearly. Effective visualization of learning content is essential for enhancing the quality and efficiency of education [30]. Educators therefore require a versatile tool to organize, present, and easily edit teaching materials. Computer presentations effectively meet these needs, facilitating dynamic and adaptable teaching [31].

TOOLS FOR CREATING PRESENTATIONS

Microsoft PowerPoint

Advantages: Intuitive interface, wide range of templates, support for multimedia and animations, seamless integration with other Microsoft products.

Disadvantages: High licensing cost; can be resource-intensive; collaboration can be difficult without cloud storage.

Google Slides

Advantages: Free to use, facilitates real-time collaboration, accessible via web browser, integrates with Google Drive.

Disadvantages: Fewer advanced features compared to PowerPoint; dependent on an internet connection.

Canva

Advantages: User-friendly for creating visually appealing presentations; extensive library of templates.

Disadvantages: Limited animation features; advanced tools require a subscription.

Microsoft PowerPoint is widely regarded as the most convenient and powerful tool for educators. Its accessible interface allows users to create well-structured presentations incorporating text, tables, charts, images, video, and audio. The ease of editing and its flexibility make lesson preparation efficient. In general, PowerPoint enhances online educational sessions through effective visualization, significantly improving learners' comprehension [32]. The authors' experience confirms its exceptional efficiency, as teaching is fundamentally an act of presenting information [31].

For communication outside of formal sessions, popular messaging apps such as Viber, WhatsApp, or Telegram can be used. The authors' department uses Viber due to its widespread adoption and accessibility in Ukraine.

CONCLUSIONS

Modern technologies have significantly transformed postgraduate medical education. The challenges posed by war, pandemics, and global crises have underscored the necessity of effectively leveraging digital tools. These shifts in the healthcare system must be reflected in the PGME system through the adaptation of educational processes to evolving realities.

Our analysis shows that remote technologies are an essential solution for maintaining the quality of PGME. However, their successful implementation requires addressing technical, organizational, and methodological challenges. A holistic approach is needed, including the development of new standards for remote learning, upgrades to technical infrastructure, and active collaboration among all stakeholders.

The use of widely accepted, reliable, and accessible information and communication technologies offers a practical way to overcome current challenges in medical education. Based on practical experience, a recommended approach is to utilize PowerPoint for content presentation and Zoom for online delivery, as both are accessible, reliable, and widely adopted.

As instructors and medical trainees adapt to new methods of knowledge acquisition, it becomes possible to maintain high teaching standards, ensure stability, support uninterrupted learning, and provide effective feedback.

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CONFLICT OF INTEREST

The Authors declare no conflict of interest

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RECEIVED: 23.02.2025
ACCEPTED: 18.11.2025