DIGITAL EDUCATIONAL TECHNOLOGIES IN TEACHING INFECTIOUS DISEASES: THE EXAMPLE OF ERYSIPELAS

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Abstract. The rapid digitalization of higher medical education has significantly transformed approaches to teaching infectious diseases. Erysipelas, an acute bacterial infection of the skin and subcutaneous tissues caused predominantly by *Streptococcus pyogenes*, represents an appropriate model for demonstrating the effectiveness of modern digital educational methods because its diagnosis requires integration of epidemiological history, clinical manifestations, differential diagnosis, and treatment planning. This review summarizes current evidence regarding digital educational technologies used in medical education, including virtual patients, simulation-based learning, clinical case-based learning, online learning platforms, artificial intelligence, and digital assessment tools.

Keywords: digital education, medical education, infectious diseases, erysipelas, virtual patient, simulation-based learning, artificial intelligence.

Introduction. Medical education is undergoing profound transformation due to the rapid development of digital technologies. During the last decade, higher medical schools have increasingly incorporated electronic educational resources, simulation technologies, virtual learning environments, and artificial intelligence into undergraduate and postgraduate training. These innovations have shifted educational paradigms from passive acquisition of theoretical knowledge toward active competency-based learning that emphasizes clinical reasoning, evidence-based decision-making, and practical skills [1].

Erysipelas represents an excellent educational model because it combines classical infectious pathology with modern diagnostic challenges. Although the disease is characterized by typical clinical manifestations, it frequently requires differentiation from cellulitis, necrotizing fasciitis, allergic dermatitis, deep vein thrombosis, and several inflammatory dermatological disorders.

The digital transformation of medical education extends far beyond replacing printed textbooks with electronic materials. Contemporary educational technologies have fundamentally changed the interaction between teachers and students by creating flexible, individualized, and interactive learning environments. Modern digital platforms allow learners to access educational resources at any time, participate in virtual discussions, complete adaptive assessments, and review complex clinical cases repeatedly according to their individual learning pace.

Numerous educational studies have demonstrated that active learning strategies supported by digital technologies produce significantly higher levels of knowledge retention than conventional lecture-based instruction [2]. Interactive learning promotes analytical thinking, encourages collaborative problem-solving, and facilitates continuous self-assessment. These characteristics are particularly important in infectious diseases, where diagnostic algorithms frequently depend upon subtle clinical findings and timely interpretation of laboratory investigations.

Digital education also enables educators to integrate multimedia resources including high-resolution clinical photographs, radiological imaging, microbiological animations, interactive diagnostic algorithms, and video demonstrations of clinical examinations. Such multimodal presentation significantly improves visual memory and facilitates understanding of complex pathological processes.

Case-based learning has become one of the most effective educational strategies in modern medical education. Rather than memorizing isolated facts, students analyze authentic clinical scenarios requiring integration of theoretical knowledge with practical clinical reasoning. Teaching erysipelas through clinical cases provides numerous educational advantages. Students begin by evaluating patient history, including previous episodes of erysipelas, diabetes mellitus, obesity, chronic venous insufficiency, lymphatic disorders, or skin trauma. They subsequently interpret clinical findings, identify characteristic manifestations such as sharply demarcated erythema, edema, fever, and regional lymphadenitis, and formulate differential diagnoses.Research demonstrates that repeated exposure to interactive clinical cases significantly increases diagnostic confidence and improves long-term retention of clinical knowledge compared with traditional lecture-based education [3].

Simulation-based education has become an integral component of competency-based medical education. Unlike traditional theoretical instruction, simulation enables students to practice clinical decision-making in a safe environment without risk to patients. Although erysipelas itself is usually diagnosed clinically, simulation exercises can incorporate patients presenting with fever, acute inflammatory skin lesions, or suspected soft tissue infections requiring urgent evaluation. Students learn to perform systematic clinical assessment, recognize warning signs suggesting severe invasive streptococcal infection, initiate appropriate antimicrobial therapy, and determine indications for hospitalization.High-fidelity simulation allows multidisciplinary teamwork involving future physicians, nurses, and emergency care specialists. Such collaborative learning improves communication skills and prepares students for real clinical practice. Debriefing sessions following simulation exercises further enhance reflective learning and facilitate identification of strengths and weaknesses in clinical performance [4].

Virtual patient technology has become one of the most promising innovations in contemporary medical education. Unlike traditional paper-based clinical cases, virtual patients create interactive learning environments in which students actively participate in the diagnostic and therapeutic process. They collect medical histories, perform virtual physical examinations, order laboratory and imaging investigations, interpret microbiological findings, establish differential diagnoses, and formulate treatment plans. Every clinical decision influences the subsequent course of the simulated patient, allowing learners to understand the consequences of diagnostic errors without exposing real patients to unnecessary risks [5,6].

Artificial intelligence has recently emerged as another important educational tool. AI-assisted educational platforms can adapt learning materials according to individual student performance, identify knowledge gaps, recommend additional educational resources, and generate personalized clinical cases of varying complexity. Intelligent tutoring systems provide immediate explanations after incorrect answers and encourage students to reconsider their diagnostic reasoning rather than simply memorizing correct responses. AI technologies are also increasingly used to analyze clinical photographs of dermatological and infectious diseases [7,8].

Conclusion. Digital educational technologies have fundamentally transformed the teaching of infectious diseases by creating interactive, student-centered, and competency-oriented learning environments. Virtual patients, simulation-based education, artificial intelligence, electronic assessment systems, and case-based learning significantly improve clinical reasoning, diagnostic accuracy, and long-term knowledge retention. Erysipelas represents an excellent model for integrating these educational approaches because successful diagnosis requires comprehensive understanding of infectious disease principles, differential diagnosis, antimicrobial therapy, and patient management. Incorporating digital

technologies into the teaching of erysipelas not only improves theoretical knowledge but also strengthens practical clinical competencies required for future physicians.

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