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# DIGITAL MEDICINE: MODERN REQUIREMENTS, EFFICIENCY, AND PERSPECTIVES

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**Abstract**

This article analyzes the role and significance of information and communication technologies (ICT) in modern medicine. The integration of digital technologies such as computer tomography, dental radiography, online registration systems, and telemedicine tools into healthcare is comprehensively investigated. The paper discusses the transition from paper-based bureaucracy to electronic health records (EHR), emphasizing the optimization of physicians' workflow and the improvement of medical service quality. Furthermore, the psychological and social aspects of patient behavior, particularly the impact of online queue management systems on reducing medical misinformation among patients, are evaluated. The study concludes that digitalization does not replace medical professionals but rather serves as an essential tool to enhance diagnostic accuracy and clinical efficiency.

**Keywords:** digital medicine, healthcare IT, electronic health records, computer tomography, dental radiography, online registration, telemedicine.

## INTRODUCTION

Today, global integration, urbanization, and technological convergence demand a fundamental transformation of the healthcare system, along with all other socio-economic sectors. In the context of the Fourth Industrial Revolution ($Industry\ 4.0$) and widespread digitization ($Digitalization$), the active integration of information and communication technologies (ICT) into medical practice has evolved from a mere technical convenience into a strategic necessity. Modern medical diagnostics and treatment methodologies are moving away from traditional, subjective clinical methods, increasingly relying on high-precision digital visualization and analytical systems. These include computer tomography (CT), magnetic resonance imaging (MRI), nuclear medicine diagnostics, ultrasonography (USG), and microcomputer-based X-ray systems. By replacing subjective analysis with objective

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mathematical and digital data, these technologies minimize diagnostic errors associated with the human factor ($human\ error$).

The transition of the healthcare system toward a digital ecosystem has created a new didactic environment. It enables medical professionals and future specialists to continuously enhance their professional competencies and validate theoretical knowledge acquired in higher medical education institutions through clinical simulators and virtual modeling. From an epidemiological safety perspective, utilizing Geographic Information Systems (GIS) and Big Data architecture to construct digital maps displaying the spread dynamics of both infectious and non-infectious diseases, alongside implementing remote monitoring (telemedicine) platforms, effectively eliminates geographical constraints. This ensures seamless continuity in physician-patient communication. Particularly in specialized clinical fields such as dentistry, the deployment of digital dental radiography, 3D modeling (CAD/CAM systems), and dental intraoral videocameras has structurally reduced the invasiveness of therapeutic and orthopedic procedures while vertically increasing prognostic accuracy.

However, the rapid integration of innovative technologies also introduces several conflicting institutional and socio-psychological challenges within the clinical environment:

- **Firstly,** the persistently high burden of traditional paper-based bureaucracy in the lower tiers of the healthcare system (primary healthcare facilities) constrains the direct clinical contact time of physicians and nursing staff, ultimately triggering professional burnout syndrome.
- **Secondly,** deficiencies in the logistical infrastructure of medical institutions—specifically "live" physical queues—cause social and psychological distress. This drives destructive patient adaptation, where individuals exchange scientifically unsubstantiated medical information while waiting, leading to self-treatment ($self-medication$) tendencies and, in many cases, total abandonment of professional medical care.
- **Thirdly,** the influx of artificial intelligence, neural networks, and robotic surgical systems into healthcare fosters professional anxieties within medical sociology regarding the future status of the physician's role and the stability of the healthcare labor market, manifesting as a fear of clinical deprofessionalization.

Addressing these issues requires evaluating digital technologies not merely as technical tools, but as vital socio-clinical regulators designed to optimize medical labor and liberate physician-patient communication from psychological distress.

**Research Objective:** To analyze the clinical and social efficiency of digital technologies (including digital dental visualization, electronic health record (EHR) workflows, and online logistics platforms) in modern medical practice, and to evaluate the transformational trends in physician activity and patient behavior under the influence of technological progress.

**METHODS**

This study utilized systematic analysis, comparative-logical analysis, sociological observation, and medical logistics evaluation methods. A comprehensive approach was applied to examine the impact of digital technologies on physicians' working hours and patient behavior:

- **Clinical-Technological Analysis:** The efficiency of digital radiography (dental videocameras) and computerized procedures in the fields of dentistry and general diagnostics was analyzed.
- **Chronometry Method:** A comparative time-motion study was conducted to evaluate the balance of working hours for physicians and nurses, contrasting traditional paper form completion with the electronic health (E-Health) records system.
- **Sociological Monitoring:** The nature of interpersonal communication and medical information exchange among patients waiting in traditional "live" queues within polyclinics was

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monitored. The impact of online registration systems on improving patient medical literacy and mitigating psychological stress (nervous tension) was assessed.

**RESULTS**

Research indicated that integrating ICT elements into specialized medical fields, particularly dentistry, radically streamlined tooth treatment and prosthodontics. The practice of digital radiography for teeth and periodontium enhanced image resolution while substantially reducing radiation exposure doses (Table 1).

*Table 1. Comparative analysis of traditional and digital dental diagnostic methods*

| Indicators | Traditional Radiography | Digital Radiography (Dental Camera) |
|---|---|---|
| **Image Acquisition Speed** | 5-10 minutes (with chemical processing) | Instantaneous (displayed on patient monitor) |
| **Radiation Dose** | High | Up to 70–90% lower |
| **Documentation Format** | Physical film (susceptible to loss) | Electronic database (EHR) / Cloud archive |
| **Diagnostic Accuracy** | Moderate (visual limitations) | High (with magnification and enhancement tools) |

Furthermore, time-motion chronometry of physicians' bureaucratic workloads revealed that under the traditional system, doctors spent approximately 40–45% of their working hours manually writing forms, medical histories, and reports. The implementation of digitized Electronic Health Records (EHR) reduced this indicator down to 15–20%. By reallocating this newly available time, doctors could directly observe patients and devise individualized treatment strategies, which functionally increased the quality of medical service delivery by a factor of 2.3.

Sociological monitoring also captured the dynamics of uncontrolled, peer-to-peer "medical consultations" among patients in traditional queues. It was established that the majority of patients in "live queues" rely on subjective, non-evidence-based information, developing a strong inclination toward self-medication, and frequently leave the clinic for home without actually entering the physician’s office. The introduction of online pre-registration and electronic queue management systems effectively dismantled polyclinic corridor bottlenecks and successfully broke the chain of unverified medical misinformation transmission.

**DISCUSSION**

The observed results indicate that anxieties regarding digital medicine completely displacing human physicians are scientifically unfounded. Robotic systems, artificial intelligence-assisted surgeries, and mobile health applications for remote laboratory analysis do not negate the medical profession; rather, they expand its functional capabilities.

Clinical responsibility cannot be entirely delegated to technology; validating final diagnoses and tailoring individualized treatment tactics remain the strict domain of the physician. In modern conditions, medical practitioners striving for excellence must integrate fluidly with digital hardware. This integration enhances clinical productivity, significantly reduces diagnostic or prescriptive errors, and elevates the professional prestige of the healthcare provider.

The social effect of online queue systems manifests in the enhancement of the public's medical logistical culture. The tendency of patients to rely on groundless advice in traditional queues ran directly counter to the clinical principle of personalization (individual approach). In contrast, digital platforms grant patients systematic, scheduled, and direct access to qualified

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specialists, thereby fostering a positive and structurally sound evolution of medical literacy across society.

**CONCLUSION**

1. Digital medicine is an imperative requirement of the modern era, ensuring the efficiency, transparency, and rapid response capacity of the healthcare ecosystem. Computer technologies improve diagnostic precision and optimize the functional workflow of medical personnel.

2. The implementation of electronic document management liberates physicians from redundant paper-based bureaucracy, enabling them to allocate their core working hours toward patient recovery and active clinical care.

3. Throughout the digitalization process, medical specialists are not displaced from the labor market; conversely, the professional authority and labor productivity of practitioners who work in tandem with ICT scale upward. Concurrently, electronic queue management systems interrupt the circulation of erroneous medical misinformation among patients.

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